

Child Development and the Curriculum

THIRTY-EIGHTH YEARBOOK, PART I

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THE
THIRTY-EIGHTH YEARBOOK
OF THE
NATIONAL SOCIETY FOR THE STUDY
OF EDUCATION

PART I
CHILD DEVELOPMENT AND
THE CURRICULUM

Prepared by the Society's Committee on Maturity

CARLETON WASHBURN (Chairman), JOHN E. ANDERSON, FOWLER D. BROOKS,
LEO J. BRUECKNER, KAI JENSEN, ARTHUR T. JERSILD,

HAROLD E. JONES, and RALPH W. TYLER

Assisted by Members of the Society and Others

Edited by

GUY MONTROSE WHIPPLE

THIS PART OF THE YEARBOOK WILL BE DISCUSSED AT THE CLEVELAND MEETING OF
THE NATIONAL SOCIETY, SATURDAY, FEBRUARY 25, 1939, 8:00 P.M.

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For Constitution of the Society, Minutes of the Atlantic City Meeting, Proceedings of the Board of Directors, Report of the Treasurer, and List of Members, see Part II of this Yearbook.

EDITOR'S PREFACE

The idea of a yearbook discussing the suitability of various parts of the curriculum to various stages of the child's maturing was first broached by Superintendent Carleton Washburne in April, 1934. He elaborated his ideas in a conference with the Board of Directors at the Atlantic City meeting, February, 1935, and was asked to embody the salient points brought out in the discussion that ensued, with the thought that a yearbook on the theme proposed might be published in 1939. At its next meeting ten months later, there was further discussion by the Board, and shortly afterward, February, 1936, the Board appropriated one hundred dollars to pay the expenses of a conference between Messrs. Anderson, Freeman, Stoddard, and Washburne to canvass the situation carefully and report whether the data and the principles that could be assembled would appear to justify undertaking such a yearbook. Circumstances made it impossible for Chairman Freeman to assemble this group prior to the Chicago meeting of the Board, July, 1936, at which time, however, the projected yearbook was tentatively approved, subject to the favorable report of another group — Messrs. J. E. Anderson, Fowler Brooks, Kai Jensen, A. T. Jersild, A. K. Loomis, Carleton Washburne, and Professors Dora Smith and Beth Wellman. The sum of two hundred fifty dollars was appropriated for the meeting of this group.

At the New Orleans meeting of the Board, February, 1937, Mr. Washburne submitted a nine-page report embodying the recommendations of seven members of the group just mentioned. The Board then officially endorsed a Committee, consisting of Messrs. Anderson, Brooks, Jensen, Jersild, Harold Jones, Paul McKee, and Ralph Tyler, to operate under the chairmanship of Superintendent Washburne. Shortly thereafter Professor L. J. Brueckner replaced Professor McKee, who felt unable to serve. The Board appropriated \$1100 for the Committee's work.

Subsequent action of the Board in dealing with this Yearbook has been concerned mainly with the question of its length — it was the hope of the Board that the volume might be limited to 300, or at most 400 pages — and with the question of adequate subsidy — to the original appropriations the Board added \$250, and later \$210 more, bringing the total appropriations to something over \$1750.

The fitting of instructional items and activities to the developmental level of the child in such a way as to secure maximal educational effec-

tiveness is certainly one of the most complex and likewise one of the most crucial problems in curriculum-making. Ideally, it presupposes precise knowledge of hundreds of details of the process of maturing over a broad range of physical and mental traits; it draws extensively upon our knowledge of child psychology; it demands full familiarity with individual differences; it necessitates skill in the techniques of measurement; it compels exhaustive classroom experimentation; it inevitably reaches into the facts and principles of sociology for guidance; it very likely implies adherence — even though it be not explicitly recognized — to some underlying principles of political and educational philosophy if not to a more or less complete system of general philosophy.

In the case of the editor, the consciousness of this intricacy of the factors involved in curriculum-building and of our distressing ignorance of the factors themselves, and particularly of their reciprocal interactive effects when built into an educational system, has long bred a spirit of humility, so that the spectacle of thousands of teachers and administrators blithely producing thousands of courses of study has either saddened or amused — as the mood might chance to be. The outcome bears, it would almost seem, a relation to an ideal educational instrument about like that of a child's home-made push wagon to a modern stream-lined flyer.

Welcome, then, is this volume that has the outstanding merit of assembling within one cover the gist of what we know about the development of the child and, most fortunately, frank and specific listings of what we wish to know and ought to know, but don't. No one ought to be allowed to tinker with a curriculum until he has become familiar with this Yearbook.

G. M. W.

INTRODUCTION

INTRODUCTION

CARLETON WASHBURN

Superintendent of Schools, Winnetka, Illinois
and Chairman of the Society's Yearbook Committee

I. AIM OF THE YEARBOOK

This Yearbook undertakes to present such data as are available to indicate at what period in a child's life, from birth to adulthood, he can most advantageously undertake any given activity or achieve any given unit of learning. It assumes that before education can be really effective we must understand child nature. We must know better than we now do what the developing organism is reaching out for at each successive stage. We must know much more than we now do about the experiences, knowledge, and concepts of the child at each level of development. We must learn how to measure at successive levels the child's capacity for adding to his experiences and interpreting them. We must measure the assimilability of new experiences to which the developing organism is to be exposed. At present we are in the first crude beginnings of this stage of scientific approach to our problem.

To confront a child with tasks for which he is not ready, with the implication that he should succeed, gives him a feeling of failure, undermines his security. Instead, we must guide him into those learning situations that he can attack effectively and with sufficient success to yield satisfaction, encouragement, and growth.

The Yearbook recognizes that there may be a definite discoverable time during a child's development before which any attempt to teach a given process, skill, body of knowledge, concept or attitude, within the ordinary means of the school, is liable to be inefficient or even futile. It recognizes, on the other hand, that perhaps the optimal time for a given unit of learning or activity may be a function of the method used in teaching; a function of the preliminary background, knowledge, and experience of the child, or a function of his needs and society's demands upon him, as much as — or more than — a function of his mental and physiological maturity.

It is recognized that a child's needs are a composite of his physiological and mental growth and the culture in which he is growing; that

they will vary as the culture changes; and that they will vary from child to child, both as to the degree of their existence and as to the level of development at which they manifest themselves or may be made to manifest themselves.

It is recognized that the school is a part of the total educational program of the community, including the activities of all its social agencies that affect the character and development of each individual. The importance of non-school educational agencies is therefore recognized, even though the Yearbook will largely confine itself, both because of the limitation of space and because of the nature of available material, to those parts of the curriculum controlled by the school.

There could be three possible yearbooks in the general field that this one yearbook attempts partly to cover. One would be a yearbook on child development, including all available data as to what the child is at each age level, regardless of any direct or evident relationship that this description would bear to the choice of curriculum. Chapter I (Section I) is a condensation of what such a yearbook might be. The second might deal with the materials and activities that should be included within the curriculum, regardless of the level of a child's development at which they could be most effectively presented and encouraged. The third possible yearbook, which is the yearbook we have prepared, deals primarily with only those aspects of child development that are likely to be a direct, practical guide to an effective organization of curricular material and activities, and with only those aspects of the curriculum concerning which we have some evidence as to when, in the child's development, they can most effectively be participated in or learned.

II. USE OF THE TERMS 'CURRICULUM' AND 'LEVEL OF DEVELOPMENT'

The terms 'curriculum' and 'level of development' need clear definition. 'Curriculum' is defined broadly enough to include any materials or activities that will affect the learning, development, attitudes, or behavior of the child. This Yearbook is not attempting to limit the curriculum to those things which the members of the Yearbook Committee believe to be desirable. If data are available in regard to the level of development for learning a unit of work, even though this unit seems to members of the Committee to be of very doubtful value, those data are nevertheless presented. For it is not the function of this Yearbook to select the items to be included in the ideal curriculum. Its function, rather, is to present all available data

regarding the placement of whatever curricular items have been investigated.

'Level of development' is used throughout the Yearbook to indicate a part of a continuous process of growth, differentiation, and assimilation taking place as a result of the interaction of the individual organism and the environment. We have recognized that a level of development may be as clearly defined a stage as the unfolding of a flower from a bud or the emergence of a moth from a cocoon, but that, on the other hand, it may be only an artificially blocked off segment of a continuous process, as would be the state of development of a tree between April 15 and July 15, as compared with the state of its development between July 15 and October 15. It is quite conceivable that the level of development necessary for one type of learning or activity, such as talking, learning to read, or learning to perform with insight a specific process in arithmetic, may be of the former kind, whereas the ability to read books of increasing difficulty of structure or content, the enrichment of meanings of words, and so on, may be of the latter. The Yearbook presents no conclusive data as to whether the levels of development are of one kind or the other, and the Committee uses the term 'level of development' to cover either meaning or both.

III. KINDS OF READINESS

The Yearbook is concerned with discussing whatever data are available in regard to the level of development when a child is *ready* for a given type of learning or activity. This readiness is made up of several factors, all of them to a greater or lesser degree connected with development.

1. Physiological Readiness

First, there is physiological readiness. There is, for example, a definite stage of physiological development prior to which a child cannot learn to walk. Again, to skip, to catch a ball of a given size, to leap over a hurdle — each requires a certain degree of physiological readiness. Sexual maturation is an important factor in readiness for certain social relationships. There may be a time before which the use of the eyes for continuous reading is organically detrimental. There may be a level of physical maturation before which the fine coördination used in writing or sewing would be so difficult as to cause serious nervous strain. Insofar as there are such levels of physiological readiness, it is desirable that evidence concerning them be gathered, and such evidence as is available is presented in this Yearbook.

2. Readiness in Mental Development: Intelligence Tests

Second, there is readiness in terms of mental development. It is impossible to separate mental development from experiential background, later to be discussed, because a child's psycho-biological development feeds upon his experiences in contact with his environment, grows through this nourishment, and draws new sustenance and material for growth from additional experiences. Yet there is a more or less common background of experience for most children in a given culture, and the reaction of the organism to this experience is evidenced by increasing capacities to learn. This process may fittingly be called 'mental development,' and the various degrees of it may be marked off for practical purposes.

So far, the most usable measure of mental development is mental age as determined by intelligence tests. Because some of our data are in terms of mental age (as a predictive instrument to determine readiness for a given learning experience), because mental age in turn is measured by intelligence tests, and because it is the feeling of the Committee that far more data should be gathered in terms of children's mental age, rather than in terms of mere chronological age or school grade, a brief digression at this point to discuss the limitations and values of intelligence tests for measuring child development seems justified.

No one who has persistently used intelligence tests in connection with teaching can fail to recognize that they give important indications of the child's capacity to learn, particularly in those types of learning represented by the academic subjects. Their helpfulness, however, may be impaired by a failure to recognize their limitations or by an attempt to use them and them only in determining a child's readiness.

Intelligence tests are limited to certain aspects of intelligence; namely, those that correlate most highly with success in academic learning under ordinary school conditions, as distinct from what might be called 'esthetic intelligence,' 'mechanical intelligence,' 'social intelligence,' 'emotional maturity,' and so on. Of course the intelligence test is not a measure of pure biological mental growth — which is a mere figment of speech. As implied above, it measures biological growth as influenced by the environment, and for the most part it is so devised as to involve those environmental influences that are so common that most children will have had them in a more or less comparable degree. Where the environment varies from this norm, either toward unusually rich experiences or toward unusually meager ones, of course the intelli-

gence test indicates a somewhat higher or somewhat lower degree of mental maturity than would be the case were it measuring the hypothetical pure mental growth. That limitation, however, is really quite unimportant from a practical school standpoint, except that a recognition of it keeps one from a fatalistic view of the I.Q.

A more serious and less commonly recognized limitation of the intelligence test is the fact that both the mental age and the intelligence quotient yielded by it are averages of various and varied functions; hence this averaging process often blinds us to the great difference that may exist in specific abilities and in readiness for specific units of learning among children with the same I.Q. and the same mental age.

We need a more diagnostic type of intelligence test, one that will determine the degree of maturity a child has reached, not merely with regard to 'general' intelligence but also with regard to specific mental functions. In predicting the readiness for various types of learning, such specific measures may be expected to be of greater value than a general or composite measure. Absolute separation of these functions is both practically and theoretically an impossibility — the human mind is not compartmentalized. But common observation makes it evident that human beings vary in the rate at which different aspects of intelligence mature. Similarly, any analysis of the actual intelligence tests now given and the different kinds of scatter in the scores of children of the same mental and chronological ages shows wide variation among individuals. There are different patterns of mental growth for different children, and these patterns, if they could be more accurately drawn, could be of very great help to the teacher.

Wisely used, however, the intelligence test gives important clues. It may well suggest that a given child has reached a level of mental development where he can effectively undertake a given learning experience. Some of the data in the Yearbook indicate, for example, that, using a given method and a limited amount of time, most children who have not reached a specified mental age on an intelligence test will not make what is ordinarily considered satisfactory progress in learning a certain unit of subject matter. Data of this sort will be given whenever they are available.

Such data do not mean, however, that there will be no exceptions — perhaps there will be a considerable number of them. A child's mental maturity in regard to a particular phase of intellectual growth required for a particular unit of learning may have outstripped his general average of mental growth; thus, he may be ready for the unit of work before he has reached the specified general mental age. Nor

does it mean that all children who have reached a general mental age, as measured by an intelligence test, have developed up to this level in the specific mental functions necessary for successful learning of a specified unit.

As matters now stand, therefore, the teacher has to look upon the mental age merely as an indication of the probability that a given child is or is not ready, in terms of his general mental development, for a specific unit of learning.

3. Readiness in Experiential Background

In addition to physical growth and mental age as criteria of readiness, and closely related to the latter, there is the factor of experiential background. Here we are in a field far less explored than that of the measurement of general mental maturity — indeed, a field scarcely explored at all in any thoroughgoing way. We know from everyday observation and from some experimental work that any new learning must be based upon preexisting experience, and that a certain type of experience is necessary for certain types of learning. For example, speech, whether written or spoken, is a symbolic learning that must be based upon real experience. An understanding of the meaning of various quantities and number relationships through experience is a prerequisite to arithmetic; and so on. We can make these statements in general with reasonable safety, but what types of experience are necessary for any given unit of learning, and how to measure the results of these experiences, is still largely a question for future research.

Experiences, as has been said, are closely tied up with physical and mental development, for children at different levels of mental development, exposed to the same environmental stimulus, will react in different ways. In a very real sense, the experiences a child has are just as much a function of his level of mental development as they are of environmental stimulus. Nevertheless, we have to distinguish the environmental factor from the psychological reaction to it, since children who have presumably the same hereditary background and have lived the same number of years may have very different types of environmental stimuli and these not only affect mental development generally but also *determine readiness for new experiences to be built upon the old ones*. Experiential background must, therefore, be definitely taken into account in considering the readiness of a child for any new learning or experience. It is an important aspect of the child's level of development.

4. Need and Interest as Factors in Readiness

The process of development from all three of these points of view — physical and mental development and experiential background — may be accelerated by a sense of need arising either within the organism or imposed upon it by social or environmental demands. Conversely, it may be retarded by a lack of need. If the child during the normal process of development is reaching out for certain types of experience, and these types of experience are not available, the sense of need may reach a point where to satisfy it the child will seize upon experiences and types of learning that would ordinarily not be responded to until a later level was reached. Furthermore, it is possible that under the pressure of social demands or the demands of the child's environment, his need for adjustment may accelerate his readiness for a new type of learning. These statements, however, are scarcely more than plausible hypotheses, unproved, but worthy of investigation.

A good all-round measure of the suitability of a given type of learning or experience to a child's level of development may conceivably be the child's active and persistent interest. It seems improbable that a child will show lasting interest and resultant effort in acquiring a learning for which he is not physically, mentally, and experientially ready — one in which he cannot, with effort, achieve some measure of success. And interest is strongly intensified by the child's sense of need. The converse of this proposition, however, is not necessarily true. A child's lack of interest may be due, not to the unsuitability of the unit of learning or experience to his level of development, but rather to the unassimilable form in which it is presented, or to his failure to realize the need for the learning, or to the failure of the environment to stimulate the interest. The method of teaching, the form in which the experience or learning unit is presented, may be at fault, rather than the actual nature of the material.

IV. LIMITATIONS AND APPLICATIONS OF THE DATA ASSEMBLED

In fitting the curriculum to the level of a child's development, then, we should know the relation of any given unit of learning or of any experience to the child's physical development, his mental age, and his experiential background. We should reckon with his sense of need and should gauge the suitability of the material or of the mode of its presentation in terms of the child's interested response.

Obviously, we are a long way from the degree of knowledge that

would make such an organization of the curriculum a complete possibility. Furthermore, even if we knew, on the average, what measure of development was necessary for a given curricular experience, we could be certain that there would be deviations from this norm on the part of individuals. Regardless of the mass of statistical data gathered, a certain amount of trial and error will always be necessary, an observation of the child as a whole and an acquaintance with him on the part of the teacher. All that the data in this Yearbook can hope to do, and even all that we can hope for from future research along the lines that will be suggested, is to give the teacher and the curriculum-maker practical clues and suggestions — a background of general knowledge as to the relationship of curriculum to child development, an indication of probabilities, a guide as to paths that are liable to be unsafe, and other paths that are likely to lead to desired ends.

Throughout the Yearbook it must be borne in mind that the data are never complete. The best indications we have as to the level of development most effective for learning a given item fail to measure many of the elements of developmental readiness. The time of learning and the method of teaching are necessarily restricted in order to keep the experiment under control. In every case where the data point to a given level of development as being the best for learning a given unit of the curriculum, question may legitimately be raised as to whether a variation in method, a more functional setting, a closer connection between the unit of learning and the child's experiences, or a greater length of time might not have materially influenced the conclusions reached. The field is a new one, and there are no data that are really conclusive. There are, however, many indications that may be practically helpful.

The Yearbook raises far more questions than it answers. To what degree must time and effort be increased in order to teach a given unit at a level below that thus far found to be the most efficient for the teaching? How far down the developmental sequence can a unit be pushed by increased effort? What, if any, strains does this impose? Conversely, what, if any, is the harm of postponing a learning experience considerably beyond the development level at which it could profitably be engaged in? To how great an extent does method of teaching influence the level at which learning can take place effectively? To how great an extent do inherent needs and social demands influence it?

To such questions as these research, to date, gives almost no answers. There are, however, clear implications as to the need for adjusting the curriculum to the child's development and there are indications that the

present curriculum is at certain points badly out of harmony with it. There is a clear implication that our present scheme of grading and annual promotions, with its assumption that practically all children in a given grade are above practically all in the preceding grades and below practically all in the grade higher, is utterly fallacious, and that, in the present type of school organization, any given classroom has to be recognized as being made up of individuals or small groups differing widely from one another in their levels of development, overlapping grades one or two years lower and one or two years higher. This raises the question as to how children should be grouped, whether it is more efficient to have the wide range of development levels now existent within our classrooms or to group children in terms of levels of development. Whichever way they are grouped, however, the Yearbook makes it clear that adaptation to the levels of development of each child or of each small group of children of approximately the same degree of development is important for effective learning.

V. THE PLAN OF THE YEARBOOK

The plan of the Yearbook is briefly as follows:

Following this Introduction, with its general account of the Yearbook and of the theory underlying it, Section I is given over to a single general descriptive chapter on "Child Development and the Growth Processes," considered without specific relation to the curriculum.

Section II, which makes up the bulk of the Yearbook, is a subject-by-subject analysis of available data on the curriculum in relation to child development.¹ The treatment might have been horizontal, taking each level of development and discussing all the types of curricular material and experience suitable thereto. We have found, however, that the nature of the data and convenience in treatment make a vertical subject division more practicable. This is discussed further in the Preface to Section II.

Section III looks into the future, discusses research techniques applicable to the problem of the Yearbook, and discusses the significance of the Yearbook from the standpoints of child development and of educational development.

¹ The treatment of one important subject, that of science, unfortunately has had to be omitted because Professor C. N. Pieper, of New York University, who was in charge of the preparation of the chapter, was unable, on account of illness, to carry out the work he had planned.

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SECTION I
THE DEVELOPMENT OF THE CHILD

CHAPTER I

CHILD DEVELOPMENT AND THE GROWTH PROCESS¹

JOHN E. ANDERSON
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and Professor of Psychology
University of Minnesota, Minneapolis, Minnesota

I. INTRODUCTORY

Before discussing the relationship of the subject matter of the school curriculum to developmental level, it is necessary that we know something of the course of development in the child. In recent years many centers for child study and many individuals have been so active in collecting data that much more information is available now than a decade or two ago. It is the purpose of this section of the Yearbook to present in broad outline the growth and development of the child from birth to adult life. This general material will serve as a background for the more specific discussions that follow.

The child is a living being, moving from birth to maturity. Any particular moment of his life is a point of transition from an earlier to a later level of development. The child, therefore, is dynamic, not static. He is engaged in going through a developmental course that will gradually carry him to maturity. He is moving from the dependency of infancy to the independence and self-reliance of adult life by building habits and skills and attitudes that will enable him to get along effectively in the world of his fellows and to meet the stresses and strains of adult living. The test of an educational program lies, then, in the effectiveness with which persons who as children have moved through that program meet the problems of adult living. In connection with each educational procedure we should ask ourselves

¹ The material of this chapter is on a level somewhat different from that of the remainder of the Yearbook, as it is an outline summary of the field rather than a detailed and critical analysis of the literature. Hence, it constitutes a section by itself, introductory to the discussion that occupies the body of the Yearbook, Section II. Specific references have been omitted because of their bulk, and a bibliography has been appended that lists only a few of the more general references.

whether it makes the child more dependent upon adults or whether it actually leads him forward toward an independent solution of his own problems.

Although the child's development is a continuous process that moves forward by small amounts, nevertheless it seems to have a saltatory character at some periods. When the appearance of any response is dependent upon the maturing of a number of processes or functions, the overt act will not appear until all these functions are at an appropriate level. The taking of the first step is such an act. Viewed as a process, it is dependent upon a number of maturing functions that develop gradually; viewed by parents or observers, it is a striking change in level of functioning.

The changes that take place in a short time are slight in amount. At the age of six years and three months, the child differs very little from what he was at age five years and nine months, even though in the intervening period he has reached the legal age for school entrance. If, however, a child is observed after an interval of three years or of six years, the changes that have taken place in his bodily structure and behavior are very marked, because the small changes that take place from day to day have accumulated over a relatively long period. Further, it is likely that each bodily organ, each body part, and each mental function has its own characteristic growth curve, with its own periods of rapid rise and its own point of maximal development, different from that of any other organ, part, or function. Development is, then, not a single uniform process that is general in character, but rather the sum of a whole series of specific growth processes, many of which are interrelated. It is quite possible, therefore, that the subject matter of the curriculum draws upon not one but many functions, and that no specific developmental process will be found correlated with any specific curricular material.

II. MATURATION AND LEARNING

1. Their Interrelation

In discussing the relation of development to the curriculum, two interrelated processes must be distinguished, each of which makes its own contribution. The first may be called 'maturation,' the second, 'learning.'

By 'maturation,' we refer to the fact that during the developmental course all children follow a very similar order of development, irrespective of the environment to which they are exposed.

Approximately nine months after conception, the child is born. Fourteen months after birth he walks, and between twelve and fifteen years, depending on his sex and rate of development, he reaches puberty. The nine months' term from conception to birth shows some, but relatively little, variation. Babies in a wide variety of climates, of very different racial stocks, and under greatly varying conditions have been found to walk on the average at approximately the same age. Although there is somewhat more variation in the appearance of puberty, still this variation is relatively slight in comparison with the variation that would be possible if it were controlled only by environmental factors.

These are outstanding instances of the maturing process. But they can be paralleled by instances of many more specific responses that appear at their appropriate time and in a definite sequence of order in relation to other responses. Investigation has shown that many such responses are only slightly susceptible to training and that their time and order of appearance can be predicted for any group of children with a high accuracy. One can therefore describe the human being during the developmental period as going through an unwinding or unfolding process, in which the order of events is determined by internal factors.

There are, however, other types of responses that vary markedly with the environment and the opportunities afforded the child. For instance, because of the variation in state laws governing the age of school entrance, children in some regions do not learn to read until eight or nine years, while in others they learn at five or six. Some areas have only 10 percent literacy; others have 90 percent. Whether a population is literate or illiterate depends almost entirely upon the environmental background and the societal demands under which its members develop.

It is obvious that this distinction between maturing and learned responses is not a hard and fast one. For each system of responses and each phase of development there are variations in the extent to which the maturing factor and the learning factor determine its appearance. Thus, the appearance of some responses may be determined nine-tenths by internal factors and one-tenth by environmental factors; in other responses the internal factor may have a weight of 50 percent, and in still others a weight of only 10 percent.

In many instances a portion of a response system may be traced to one factor and another portion to other factors. Thus the time of

appearance of talking seems to be determined by internal factors, while the form and content of language is determined by environmental factors. A boy's strength and coöordination are determined by a combination of internal and environmental factors; whether he utilizes them in playing baseball or in playing cricket depends upon the particular environment in which he develops.

Moreover, the relation between maturation and learning may vary with developmental level and with the level of learning that the child has reached. For instance, retarded children show greater inadequacies in meeting life's demands as they become older. In the later stages of learning, the child approaches limits that seem to be set by his constitution.

In the subsequent discussion no consistent attempt will be made to distinguish between those response systems that are clearly to be traced to maturation and those to be traced to training. After all, the teacher or other worker with children takes the child as he is at any particular moment and deals with the skills, knowledge, and attitudes he possesses, regardless of their origin in internal process or external demand.

2. Learning and Plasticity

The capacity to learn or to modify behavior does not appear at any particular age or level of development, but is a general characteristic of the whole life process and hence is found in some degree in old and young alike. Often this capacity is spoken of as 'plasticity.' The very interesting general question arises whether the child is or is not more plastic than the adult, and whether or not the younger child is more plastic than the older one.

Plasticity might appear to be greater at earlier than at later years because of either of two factors. It is possible that the nervous system of the younger organism is inherently more plastic. Although there is some warrant for such a belief, the experimental evidence indicates that differences in plasticity that are intrinsic to the maturity of the nervous system are relatively slight and can be compensated by increased motivation. With increased motivation an older animal or a human being shows a learning curve of the same type or form as does the moderately motivated younger organism. This suggests that differences in plasticity cannot be traced to basic nervous structure, but must be sought in other areas.

The second possibility is that the younger individual acquires new skills easily because he lacks interfering habits whereas the older or-

ganism is handicapped by the possession of many habits that run counter to the new ones to be acquired.

The experimental literature on transfer of training and on interference is voluminous. Some of it indicates that the younger animal or human being shows greater capacity for transfer than does the older. In fact, some of the same situations that produce interference in the older individual result in transfer in the younger one. It is likely, then, that the advantage in learning which the younger individual possesses is due to the priority of the habit systems he is acquiring rather than to any intrinsic difference in plasticity. In other words, young children learn with a high degree of effectiveness the skills put before them because there are not interfering habits, and they lose the capacity to acquire new skills in proportion as they build up a series of interfering habits. Early habits, because of this priority and because of the fact that they are overlearned, *i.e.*, receive much more practice than later skills, may be more stable and lasting than habits formed later. In old age early childhood memories seem to come back much more readily than do the memories of middle or late adult life.

3. The Acquisition of Skills and Knowledge

Quite irrespective of decreases in plasticity due either to intrinsic nervous factors or to interfering or blocking habits, the child possesses a very high degree of adaptability and of capacity for learning throughout the entire developmental period. It may also be said that up to a certain point the greater the amount of motivation, the more rapid and easy will be the child's acquisition of any particular skill. The relation between the amount and kind of motivation and the ease with which a particular skill is acquired may vary with developmental level. So little research is available on this topic that we can only point out the possibilities of its existence and hope that someone will be stimulated to further research.

The ease and rate of acquiring a skill are also related to the amount of time spent in acquiring it. Other things being equal, a child with twenty hours of practice in reading will read less effectively than a child with two hundred hours of practice, who in turn will read less effectively than a child with a thousand hours of practice, providing that there has been motivation throughout the practice, that similar methods of instruction and materials have been used, and that some satisfaction has been received from the reading process itself. It is also clear that mere passive reproduction of material to be learned

is relatively ineffective in comparison with active and energetic participation.

The developing child is engaged in the acquisition of two types of responses that may, however, be the ends of a continuum: the first includes 'skills' and 'knowledge,' and the second includes what may be called 'attitudes' in a broad sense.

In the case of skill, the child is acquiring a method of doing or accomplishing a particular task, such as reading a sentence, writing a word, adding two figures, or making a particular movement or series of movements in a game. In acquiring knowledge, the child learns facts and processes in order to be able to answer the questions, *How?* *When?* *What?* *Why?* Skills are markedly susceptible to direct instruction. The rate at which skills and knowledge are acquired varies with the amount of practice or instruction received by the child and the amount of his motivation and active participation in the process of learning. A skill develops by the selection and fixation of certain responses and by the elimination of others, and in its early stages is marked by much trial-and-error behavior. In its later stages a skill is a smooth-running, automatic, and relatively easily elicited system of responses, with little or no emotional tone. A high level of skill in any realm of activity is the product of practice over a long period of time and is developed most effectively under conditions in which practice is distributed rather than concentrated.

4. The Acquisition of Attitudes

Attitudes, on the other hand, include such states as beliefs, complexes, prejudices, ideals, and ambitions, in which in addition to a knowledge, or skill, element there is an emotional, or feeling, element. Attitudes, in comparison with knowledge and skills, seem generally to be acquired much less through direct and formal instruction and much more through indirect and informal instruction. They are markedly responsive to the general attitudinal tone of the environment and may possess a very high degree of resistance to modification or change, particularly if the emotional element is prominent. In some instances attitudes may be set on the basis of a single experience, whereas a skill very seldom appears on the basis of a single experience. Because we know so much more about the acquisition of skills than we do about the acquisition of attitudes, discussions of the relations between development and the curriculum tend to be resolved into discussions of skills and knowledge rather than of attitudes. Many of the activities in

which the school is engaged involve the building up of very complex configurations of skill, knowledge, and attitude.

III. CONDITIONS THAT FACILITATE LEARNING

Because the teacher is primarily concerned with the modification of the behavior of children, she should be familiar with the more technical literature on learning, which is available in many surveys and discussions. Here we can give only a very brief and general summary of the conditions that facilitate learning.

Learning takes place most readily in a stimulating environment that continuously presents the child with new and interesting possibilities that keep him moving forward with zest and initiative. Any environment that is so routine and deadly in its nature that it fails to offer continuous stimulation is not conducive to effective learning. Neither is an environment that is so tense and so full of pressures that the child becomes emotionally wrought up and nervous. The ideal environment lies between these extremes. It is one that includes stimulating equipment, opportunities for constructive activity, friendly encouragement, and a willingness to permit the child to experiment and to do for himself. It is one in which, by both example and enthusiasm, the child is led to imitate the desirable behavior of the older person and at the same time to strike out for himself.

1. Provision of Adequate Opportunity

Some of the characteristics of this environment may be more fully described. The somewhat trite observation that worthwhile skills or activities do not develop over night or in a day or a week needs reemphasis. The child is engaged in building permanent skills and is in school for a long period of time. The school environment functions effectively when it is arranged in such a way that the child has many opportunities for practicing those skills that he will ultimately utilize. Otherwise the child is likely to be permanently handicapped. Moreover, patience and confidence in his ability to establish such skills are essential characteristics of a good environment.

2. Exploratory Behavior

Modern studies have shown that in the early stages of learning there is much of what has been called 'trial-and-error behavior.' The child makes many mistakes but is occasionally successful in carrying through the desirable act. As time passes, errors disappear and suc-

cessful responses become fixated. But conventional descriptions in terms of trial-and-error behavior are inadequate representations of what the child actually does. In his approach to a new situation he shows much exploratory behavior. Many responses are tried and eliminated. As the child continues to function in the situation, there is closer and closer approximation to success. The child sees the results of these approximations and progressively modifies his behavior so that success becomes more certain. Thus, in any complex adjustment, there are involved not only random activity, but also a continuous series of approximations to success that are facilitated by a combination of exploration and elimination, by such accidental successes as occur, and by a progressively greater insight into both the goal of the behavior and the inappropriateness of certain responses in attaining that goal.

3. Properly Pitched Standards of Performance

If from the outset the child is surrounded by excessively high standards and a rigid insistence upon perfect performances, the easy and smooth acquisition of skill may be interrupted. If, however, the environment is so lax that he is permitted a great number of errors without correction, he will not learn the difference between correct and incorrect behavior and will profit little from his experience. The ideal learning environment is between the extreme of excessively high and rigidly maintained standards and that of no standards at all. From the practical standpoint the teacher should be interested in the final outcome of particular training procedures rather than in the minor inadequacies of the early stages of learning.

4. Stress upon Success

If emphasis is placed upon the successes of the child, learning will take place quite as rapidly as if emphasis falls exclusively upon his failures. Although, ideally, errors must be pointed out in order that the child may profit from them, many errors disappear with time if attention is focussed not upon the errors themselves but upon what is desired. We must never forget that the child can learn without instruction if he is kept in a situation and motivated to it. The teacher's function is in some degree to shorten this time-consuming and wasteful process. It is a poor teacher who shortens it to such a degree that the child slides over difficulties or who lengthens it so much that the child blunders for a long time without guidance.

5. Demands Fitted to the Level of Development

Since the child is a growing individual who successively passes through many different levels of development and who is in an environment that constantly changes, it is important that tasks and demands be graded to his general developmental level. A task that is very difficult for a six-year-old may be easy for a ten-year-old. The response demanded of a fifteen-year-old may be far above that demanded of a five-year-old. In setting standards for skills and behavior the teacher must be very careful not to project adult standards onto the child or standards appropriate for older children onto younger children. At any level of development, it is desirable to keep standards somewhat, but not too far, above the child's actual accomplishment. We want him to move forward but not to become discouraged and disheartened in the process. This shifting balance between standards and accomplishments is difficult to maintain, especially when the teacher has in her room a group of children who vary widely in their abilities and backgrounds. But the more successful teacher is the one who is able to adapt group techniques to individual needs and is adaptable enough to modify and change her program of instruction to meet such needs.

6. Effective Motivation

In recent years it has become increasingly clear that the outstanding problems in the field of learning center about motivation. We know relatively little about the most effective methods of motivating human beings. As more and more research is done in this area, a respectable body of literature will become available. What is now available indicates that there is a wide variety of methods of motivating children. One such method is through the direct application of external pressure. In a sense this may be called the 'traditional' method of motivation, because society for many generations used only such direct methods of securing results. A second group of methods might be referred to as 'indirect,' for here leadership and guidance are substituted for a direct and immediately forceful attack upon the child. Should we *make* children do things, or should we *lead* them to *want* to do things? This question expresses the difference between the two approaches. Three generalizations are in point.

1. Encouraging, positive, and specific directions are much more effective in eliciting desirable conduct on the part of the child and result in more permanent and satisfying behavior than do discouraging, nega-

tive, and vague directions. The tone of voice, the manner of making the request, and the personality of the teacher affect the actions of the child. If the teacher asks herself the question, "How can I most effectively stimulate or lead my children to desirable conduct?" she will build up more permanent and lasting insight and more effective teaching techniques than she will by insisting upon prestige, fear, and force as motivating devices. Lasting insight and effective teaching techniques are dependent upon the teacher's awareness of the progress made by the group and by each individual child under her control. Such evaluation of the child's performance in terms of his progress gives her a continuous series of new insights into the teaching function.

2. The example furnished by older persons is of great importance in determining the child's conduct. A teacher who is enthusiastic and interested in her subject matter and her children, who feels that her relations with the children are vital and significant, is much more likely to set up stimulating learning situations than is a teacher who takes her job as a matter of course and thinks much more of her salary check or her downtown engagements than of her teaching. Emotional states are among those readily communicated to others. A teacher who shows fear, nervousness, or excitement is likely to find her pupils showing similar traits. A teacher who is calm, patient, interested, and enthusiastic is likely to find similar reactions in her pupils. A teacher who preserves some of the curiosity and spontaneity of her own youth will find her children making a broad attack upon life's problems.

3. Learning proceeds most rapidly and surely when the child has a goal or an object to achieve. A child making a model ship may work enthusiastically at it for many hours without any external motivation because he is anxious to get the model done and to see how it works. A boy is interested in athletic performances because he can see in them definite and tangible goals that he may attain. One of the primary functions of the school is that of building up goal-seeking behavior in the child in order that he will look ahead and plan and prepare rather than live in the immediate moment. In modern education, various procedures known as 'project methods,' 'the activity curriculum,' and so forth have been devised and are in use for achieving these ends. They possess two common characteristics. In the first place, the activities are in the beginning closely related to the immediate interests of children and then move out to more remote and less tangible activities. In the second place, the child is brought to feel that he is a vital part of the situation. Thus education becomes something near the

child rather than remote from him, something that does not seek to force things upon him simply because an adult feels they ought to be done.

7. The Paramount Problem of Internal Sanctions for Socialized Behavior

In one sense the greatest educational problem is that of building within the child a capacity to work for socially desirable ends under the motivation of his own internal desires. In the early stages of the educational process the child is surrounded by situations that protect him. He is told what to do on various occasions and he builds up some skills because the adults with whom he associates see their ultimate usefulness. Gradually this dependence upon the environment for stimulation must be transformed into an internal desire for accomplishment, for attainment, and for learning. How is this transformation to be made? Certainly it cannot be accomplished by continuing to protect the child from every hazard and every strain. Nor can it be done by surrounding him with constant commands and directions that permit him neither latitude nor opportunity to make his own choices and decisions, for such procedures increase dependence rather than decrease it. It can, however, be done through willingness to give a child responsibilities appropriate to his level of development, and through increasing the opportunities for responsibility along with his growth, so that, as he moves toward maturity, he comes more and more to exercise the self-control and self-reliance that has been described as the desirable outcome of education.

If we examine the type of environment that leads to the development of self-control, we find that it is one that gives the child room to grow mentally, as well as physically. It is an environment that has some rigidity and yet some laxity, that stimulates by example, encouragement, and the provision of opportunities, and that at the same time permits the child to meet in small degree some of the stresses, strains, and rigors of life that he will meet in adult life.

Learning is an exploratory process in which the child is trying a wide variety of capacities and abilities in an environment with manifold possibilities. Certain skills must be acquired because society demands that they be acquired; others depend upon the make-up of the individual rather than upon a universal social demand. It is inevitable that in some regions of this environment the learner will be blocked and thwarted; in others he will be successful and gain the feeling of

accomplishment. If the child is continually balked and thwarted, if he fails to secure a feeling of success and accomplishment in connection with many specific acts or bits of learning, the likelihood of his successful adjustment is thereby made much more remote. If, in his contact with the school and the teacher, he feels himself growing, knows that his skills are improving, and finds himself gaining confidence in his own ability to make decisions and to postpone the satisfaction of immediate impulses and desires in order to achieve remote ends, it may be said that his school is doing an excellent job. It is here, then, that we must stress the fundamental questions, "What are the conditions that are most favorable to learning on the part of this particular child? What are the conditions that are most favorable to learning on the part of the group of children in this particular room?" These are questions that should be uppermost in the teacher's mind, because the endeavor to seek answers to them will maintain in her that flexibility so essential to effective work with growing children.

IV. OUTLINES OF DEVELOPMENT

The complexity of the growth process has already been emphasized. It consists essentially of many functions that mature at different rates and that are tied together in a single individual, the child as we know him. When the growth process is broken down into its component parts, changes in the size and complexity of bodily organs and structures, *i.e.*, anatomical or physical growth, can first be distinguished. Next can be set off the changes that take place in the functioning of the great physiological processes, such as digestion, circulation, and elimination. Third can be distinguished the changes that take place in the functioning of the organism as a whole in relation to the environment; that is, changes in behavior. These involve increases in the range of stimulation to which the child reacts in the number and character of his skills, in his ability to solve problems, in the modification of his attitudes toward life, and in his capacity to coöperate with his fellowmen through social behavior.

These somewhat artificial divisions are made chiefly for purposes of classification and description. Actually, at any particular moment and in any particular situation there is only a child functioning in relationship to his environment. Sometimes in our concern with methods we forget that we are dealing with children and we erect fictions that increase our difficulties rather than simplify them. When, for instance, we regard learning, or emotions, or memory as separate and

distinct processes, we may lose sight of the 'whole' child. Actually, all his life processes, both physical and mental, are interrelated to some degree. A disturbance or a maladjustment in one area may reveal itself in a modification or change in another area. The child in poor health may learn less effectively than a well child; a handicapped child may not be able to make normal social adjustments; a child who comes from a nervous and tense home background may find it difficult to adjust to the school; and a child who suffers from excessive fatigue because of irregular sleep habits may show a nutritional disturbance. Such observations and experiences should lead us to be cautious in ascribing difficulties in adjustment to obvious and superficial relations. We need, in such cases, to make a thorough and careful evaluation of the child's relations with his entire environment. For, as teachers, our interest lies in the whole child, and our task is to utilize whatever potentialities and capacities he has for general adjustment to life.

1. Physical Growth and Physiological Development

The most obvious changes that take place in the growing individual are increases in size. On the average, the newborn infant is twenty and one-half inches long; the five-year-old is double that height; the average adult woman is five feet, four inches, tall, and the average adult man is five feet, nine inches, tall. The rate of increase in height is most rapid in early infancy. It becomes slower in childhood, is again accelerated just prior to and after puberty, becomes slower again during late adolescence, and finally ceases. Throughout, boys are taller than girls, except for a brief period between the ages of 10 and 13 years, when girls are likely to be taller and heavier than boys. The newborn infant weighs between six and eight pounds, doubles his weight during the first year, and during early adult life reaches the weight of 120 pounds if a girl, and 155 pounds if a boy. The curve for weight is somewhat like that for height. Except for the period just mentioned, when girls are both taller and heavier than boys, boys outweigh girls. Changes in height and weight take place gradually, whether individuals or groups are considered.

If growth is examined in detail, it is found that each body part has its own characteristic growth pattern. The head, which is relatively large in the newborn infant, grows slowly during childhood and has almost reached its adult size by six or seven years. The trunk, which is relatively long in infancy, grows rapidly during childhood and more slowly during adolescence. The extremities, however, are relatively

short in infancy, grow very rapidly in childhood and early adolescence, and are proportionately much longer in the adult than in the infant. The smaller divisions of the body likewise have characteristic growth curves. In general, the parts of the body toward the head end and the point of attachment to the body are proportionately larger in infancy and grow more slowly, whereas the parts toward the extremities and farthest from the point of attachment are proportionately smaller in infancy and grow more rapidly during the period of childhood and youth.

This differential growth that is characteristic of external body parts is also characteristic of internal organs and structures. The muscles and skeleton, respectively, approximate in their growth the general form of the curve for the weight and height of the whole body. The brain and nervous system achieve 90 percent of their growth by the age of six years and grow relatively little in gross size from that point onward. The eye reaches adult size by 18 months; the sex organs grow very slowly during childhood and rapidly during adolescence. Lymph organs grow very rapidly during childhood and reach their maximal size and weight about puberty and then actually decrease in size during adolescence. There are not only changes in size and weight, but also changes in texture and structure. This fact is best exemplified in the growth of the skeleton, in which cartilage is replaced by bone and small masses of bone and cartilage, which are separated in the infant, but become joined together in the adult. Many more instances of the differential character of growth could be cited. Even this cursory summary shows how very complex is anatomical development.

Similar findings have been recorded for physiological development. The pulse and breathing rate in the infant are very rapid. With development they slow down and the blood pressure increases. The capacity of the lungs, however, steadily increases in spite of the slower breathing rate, so that the work done by the lungs is much greater in the adult than in the child. Digestive and eliminative processes likewise change with age.

The extent to which the entire developmental process, both physical and mental, is facilitated by an appropriate environment is one upon which few concrete data are available. There have been striking improvements in the height, weight, and general health of children as a result of the modern health program. Most of us would subscribe to the principle that the remedying of a defect, the improvement of physical status, the correction of a physiological deficiency, the im-

provement of an emotional or a mental adjustment will contribute substantially to the total adjustment of the child to his environment. It is not quite clear from existing data whether, in addition to the specific changes produced by a particular modification of the environment, such general changes in functioning facilitate the entire growth or developmental process. But it is reasonable to suppose that such an effect exists.

A group of important problems concerning training center about the control of various appetites and physiological processes. Normally, control of the eliminative processes is achieved during the first two years, control of the bowel coming first, and control of the bladder coming later. Control tends to develop slightly earlier in girls than in boys. Since this control is usually attained in the preschool years, it is not of primary concern to the teacher.

Many problems in the management of young children concern habits of eating. Usually by school age the child has learned to eat a wide variety of foods with relish and these problems have largely disappeared. There remain, however, occasional cases of retardation or maladjustment in nutrition that interfere with school work.

Sleeping, too, often becomes a matter of concern for the teacher in that inadequate rest may interfere with school adjustment. A table showing the average sleep of children at different age levels will be found in Chapter IV. Young children require more sleep than do older children. There is a rapid decrease from birth to five years in the amount of sleep taken. After that age the decline is slower up to the age of ten years. Thereafter, there is only a slight reduction with further age.

2. The Development of Motor Skills

At birth the range of motor acts is very limited. The infant moves his arms and legs, he turns from the dark side of the room to the light side, suckles, and so forth. During the first two years many reflexes and more complex acts appear in a definite sequence, largely under the control of internal processes. The child develops the ability to hold his head erect, to follow moving objects with his eyes, to kick or push with his feet, to grasp objects, and so on. In Figure 1 the age relations of some of the more outstanding reactions are presented.

The chief general motor response that develops in the first two years is locomotion. Although many think of locomotion as identical with the first step taken by the child at approximately 13 to 15 months, actually the processes involved are maturing for months prior to the

first step. Normally the child goes through the following sequence: a phase of crawling in which the abdomen slides on the supporting surface, a phase of creeping in which the abdomen is lifted clear and cross coöordination appears in the movement of arms and legs, a phase in which the child pulls himself to the standing position by taking hold of furniture or other objects, and finally the phase of stepping movements that terminates in walking. Once the capacity to move about has ap-

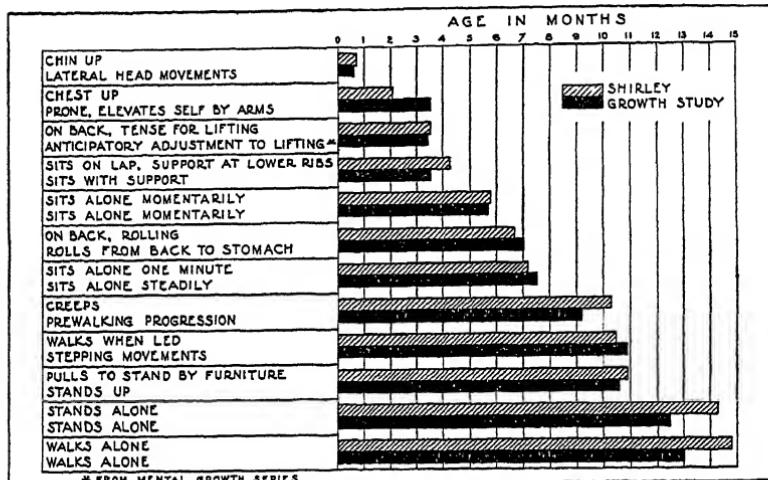


FIGURE 1.—THE RELATION TO AGE OF TWELVE MOTOR ABILITIES IS DETERMINED IN TWO STUDIES

The length of the bars shows the median age of first demonstrating the ability in the study by Shirley and in the California Infant Growth study.

peared, the pattern of the child's life changes. Instead of being a stationary object to which stimulation must come, he is now a free moving agent that can make contact with a very wide environment, and hence can have many new experiences. In the next three or four years he will establish many different locomotor skills. He will learn to run, jump, climb stairs, skip, walk a narrow rail or board, jump rope, and so forth. It is important that during this early period the child should have apparatus available that will encourage many types of locomotor play, for he develops control over his muscles through using them in a wide variety of situations and in the manipulation of many materials.

After the appearance of locomotion, no single universal motor skill appears. To a surprising degree the development of subsequent motor

skills depends upon the specific opportunities the environment offers and the character of the skills for which social example is afforded. Large muscular coöordinations seem to appear in advance of the small muscular coöordinations. Hence, modern play equipment for young children is made up in large and easily manipulable units in contrast to the tendency a generation ago to make such equipment diminutive. Great interest in playing with miniature objects comes at the age of eight or nine years, rather than at three or four.

Some difference of opinion still exists with reference to the use of large and small play materials. While modern evidence and practice tend to support the principle of larger equipment, it must not be forgotten that the child's own readiness and interests are important factors in the determination of his activities. Thus, a good environment will not be composed exclusively of one type, one size, or one piece of material, but will contain a variety of materials and play objects.

Modern research also shows that there is very little intercorrelation among motor skills. One cannot predict high skill in one activity from high skill in another. A boy may throw a ball very well and yet be poor in manipulating a saw or a hammer. It follows, then, that the environment during the early school years should give the child a wide variety of opportunities for experience in many different situations, for otherwise he cannot explore his own potentialities. There is some indication, moreover, that early practice in motor skills possesses an advantage over later practice, probably not so much because of greater plasticity as because early practice gives the child so many more opportunities for later practice. The child who learns to swim at six will likely be swimming whenever opportunities offer, whereas the child who learns at fifteen or sixteen will almost inevitably get much less practice.

There are very wide differences among children with respect to their motor capacities and the ease with which they acquire the various manipulative skills. Even though motor ability is not related to intelligence, the intelligent child has some advantage because of his capacity to understand instructions and to envisage the situation in which the skill is to be used.

Because of the child's high degree of interest in motor activities and the tangible character of the activities themselves, the educational problem is essentially one of providing material and equipment rather than one of leading the child into new interests, as is the case with many intellectual and cultural skills. Since much of children's play is motor

in its character, teachers and other workers have an excellent base upon which to build a program of guidance and instruction.

3. The Development of Linguistic Skills

In many respects the most striking feature of the development process is found in language, through which the human being develops those characteristics and activities that distinguish him most sharply from the animal and that make possible both the development of a social order and an educational program. Because a more extensive discussion of language development appears later in this Yearbook (Chapter X) only a very cursory summary will be given here.

The most striking characteristic of language is the use of a response of one modality, called a 'symbol,' to represent an experience or to take the place of a response of another modality. Thus, a flick of the throat comes to stand for the movements of arms or legs and a series of flicks of the throat is used to describe a sunset. Speech symbols appear first, followed in the school years by the written and printed symbols.

The newborn infant makes a wide variety of vowel and consonant sounds just as spontaneously and as naturally as he moves his arms and legs. The first sounds are single vowels; later, consonants are attached. At six or seven months of age the infant begins to babble; that is, to make sounds in sequences that have a superficial appearance of language but that lack meaning. Usually the first true language response or symbol used representatively occurs at about twelve months; in the next six months a few additional words appear. At about 18 months the child makes the discovery that symbols represent objects, and asks the names of objects. When this discovery is made, language development proceeds very rapidly. Soon the child is using simple sentences. Even in early infancy a distinction can be made between the language of understanding and the language of use; for at 15 months, when the child can use very few words symbolically, he will respond to a variety of commands, demands, and requests in verbal form.

Studies of sentence length and structure show that the child begins to use complex sentences early and that, by the age of five years, when he enters school, he uses every part of speech in sentences of complex structure. There is even some indication that, beyond eight years, there is relatively little further modification of spoken language. Thus the spoken language develops very early, at a very rapid rate, and has

reached a very large proportion of the adult form before the child receives school instruction. There is some indication that written language involves skills somewhat different from those of spoken language. The developmental curves for written language show a uniform and steady progression from eight or nine years up to 16 or 17 years, and even by that age have probably not reached their terminal point.

The amount of practice had by the young child in speaking is so enormous that it is no wonder that by five years speech is already a highly developed skill. The fact that corrections in spoken speech tend to come well after speech is a smooth-running and automatic process raises the question whether written language should not be permitted to develop for some time, without too much effort at correction. Perhaps too early an emphasis upon correct usage and grammar may serve to reduce the motivation of the child for writing, whereas the same corrections, applied after writing has become a reasonably automatic process, may operate to improve its quality without reducing motivation.

The environment has a marked effect on language development. Children of higher socio-economic and cultural status are definitely advanced in this respect. The only child is more advanced than is the child with brothers and sisters, and he in turn is more advanced than are twins or triplets. Apparently the only child imitates the speech of adults who are far along in the linguistic process; the single child imitates the speech of older brothers and sisters, who are a little farther along; twins or triplets imitate each other and develop poor linguistic form as well as poor articulation. In the light of these facts one wonders whether the examples of language usage furnished by parents and associates in the home and play situation may not be of more importance as determiners of spoken language than is school instruction. In any event, the first-grade teacher works with children possessing highly developed language skills that have been fixated by much practice over several years. Improvement of home speech might lighten her task considerably.

There is a definite relationship between linguistic skill and intelligence, since children of higher intellectual levels show more linguistic skill than do children of low intelligence.

Almost from the outset the use of symbols fulfills a definite social need in the life of the child. Through symbols he can modify the behavior of other persons and can change the social pattern. Far too few studies of the function of language, as distinct from its structure,

have been made; but there is clear indication of progression from accidental and superficial associations to logical thought, and evidence of growing capacity to express meanings and to adapt symbols to a wide variety of uses and functions in such a way that increased mastery of self and the external world is gained.

4. Intellectual Development

Ever since the days of Binet, intelligence tests have been widely used and have performed a very significant function in the guidance of children. Binet devised a scale that made possible the classification of any child in terms of the average, or typical, performance of a well-sampled group of children at each chronological age. For example, a child with a chronological age of fourteen years whose performance on the test is like that of typical ten-year-olds is said to have a mental age of ten years and an I.Q. of 10 divided by 14, or .71. An intelligence scale is composed of a number of items that involve the use of vocabulary, computation, problem-solving, range of information, interpretation of pictures, and so forth. Children classified as subnormal rarely adjust to the school curriculum or to life situations as effectively as do children classified as bright or superior. The reader is referred to the more technical literature for a detailed discussion of the significance of intelligence for the educational process. This literature shows that children develop in intelligence at varying rates and that there is a reasonable degree of consistency in their intellectual performances as measured by the scales from time to time. The child who at five years obtains a low rating is likely also to obtain a low rating at ten; the eight-year-old child with a high rating is likely to have a high rating when he is tested at 16 or at 17 years. Moreover, the tests have been found to be predictive in some degree of the adjustment of the child in school and in practical life. The measure, then, obtained from a battery of tests or a scale reflects a general underlying ability that is important for both learning and adjustment.

From the standpoint of mental growth, test results indicate that as the child grows older he increases in his ability to remember, to attend, to persist at an intellectual task, and to solve complicated problems. There is no precise way in which the growth curve for intelligence can be determined or plotted, because of the fact that the units are worked out on a chronological-age scale and are relative rather than absolute. But there is evidence that growth in intelligence proceeds gradually and continues from birth to maturity.

There is a definite relation between the intelligence of parents and that of children, and between children and their siblings. This suggests that there is a hereditary component in intelligence. There is difference of opinion as to the relative weight of this component. Some investigators give it almost one hundred percent, while others give it much less or even very little weight, but most investigators would weight the hereditary factor more than the environmental factor. Perhaps a conservative statement would be that, while intelligence is in large part determined by hereditary components, it is modified or changed in some degree by environmental factors. The environment determines in large part the extent, degree, and manner in which the innate potentialities of children are realized, and the manner in which hereditary capacities are put to work. In general, the more stimulating an environment is, short of extreme pressure, the better are potentialities realized.

So far as school experience is concerned, there is a definite relation between the child's intelligence level and the ability with which he handles school subject matter. This is perhaps more marked in the case of arithmetic and reading than it is in some of the other fields, possibly because it is much easier to obtain tangible evidence of performance for these subjects. Modern educational practice based upon many investigations supports the view that the school should make special provisions both for children of high intellectual level and for those who are much retarded. This may be accomplished either by appropriate advancement or delay in school progress, by the provision of an enriched or a simplified curriculum, or by the development of appropriate extra-curricular activities. The modern movement away from the educational lock-step of a grade per year of chronological age gives striking testimony to the better understanding both of individual differences and of developmental progress that has come with the scientific study of children. It is unfortunate that a trend has appeared in the reverse direction, seen, for instance, in the custom in some schools to promote all pupils in terms of chronological age.

There are a number of skills closely related to intellectual development. The child's capacity to memorize increases with age. The increase is most marked in the early years. The child's ability to attend increases rapidly during the preschool years and more slowly in the school years. It is difficult to keep a two-year-old child at a particular task or even interested in a toy for any length of time; the older child will show interest for long periods of time. In setting a program for very young children, some account must be taken of their attention

and persistence span, since they cannot carry activities over from one day to another with any marked continuity of effort. At five years, when the child enters kindergarten, more emphasis can be placed upon remote goals, and projects can be developed that carry over from day to day. This prepares the child for the much longer projects of the early school years.

Drawing ability in its earliest years appears to be very definitely correlated with intelligence. The young child draws what he thinks rather than what he sees; after the age of ten or eleven years the child tries to draw what he sees.

Musical ability, which is not closely related to intelligence, appears early and to a high degree in some children, and not at all in others. Recent studies of younger children show, however, that many children previously thought lacking in capacity have some ability. The development of artistic and musical appreciation differs in some respects from that of the skills involved in the production of works of art and of music. The range of children with possibilities of appreciation is far wider than the range of those who can perform effectively; hence, a stimulating environment enables almost every child to develop some capacity for appreciation and enables children with ability to discover their own potentialities and secure appropriate training.

5. The Development of Problem-Solving Ability and Thoughts

Within recent years there have been two distinct methods of studying the development of thought processes in children, apart from the specific studies made in connection with curricular material that are discussed in later sections of this Yearbook. The first, growing out of the animal experiments of Koehler, consists in presenting children with problems that can be solved only by the recognition of a principle or relationship, *i.e.*, not by pure trial and error. The results show that children at all age levels can solve problems of a degree of complexity appropriate to their developmental level and that, with increase in chronological and mental age, problems of greater complexity can be solved. The approach to a problem is very similar at all age levels and it ranges from pure trial and error, through exploration and elimination, which may be very systematic, to solutions without overt evidence of random behavior. With simple problems (for the particular age level) solution is likely to be immediate and may be called 'insight'; with complex problems the process of exploration, elimination, and approximation to a solution takes place slowly; with very complex problems

there is much trial-and-error behavior. In the studies of young children, cases of immediate insight have been found to occur in not over 4 percent of the trials. In the majority of children, the process of exploration, elimination, and successive approximations to the solution is characteristic. In a small proportion, blundering, ineffective, and purely random behavior seems to be typical. The whole process of problem-solving can be described as a series of approximations in which insight is shown in recognizing both the inappropriateness of some responses and the appropriateness of others. It is also of some interest that when either children or adults are confronted with a problem that is much too difficult, they struggle for a while in the attempt to solve it; then explain their failures in much the same way. Qualitatively, the types of excuses given for failure are the same, even though the adult has the advantage of being able to clothe his rationalizations in more language. While the form of the growth curve for problem-solving ability is not known, the literature suggests that the increase with age is very gradual and that experiential as well as maturity factors are significant in the development of this ability.

The second method of studying the development of thought processes in children, initiated by Piaget, involves the use of the language responses of the child, not so much for the analysis of form and content, as for the analysis of their meaning and function in the life of the child. Three tendencies in development have been described: first, a transition from egocentric responses characteristic of the young child to socialized language responses characteristic of the older child and the adult; second, a transition from an early stage, in which superficial associations are made among experiences characteristic of the young child and called 'syncretic' thinking, to an intermediate stage characteristic of the elementary-school level, in which the child is able to reason in the presence of the objects of thought, and thence to a final stage characteristic of the adolescent and adult, in which the individual is able to engage in abstract thought; and third, a transition from mystical, animistic, and magical modes of thought characteristic of children and primitive peoples to the logical, mechanistic, and causal modes of thinking characteristic of adults. The experimental literature shows that, although these transitions describe the general course of the development of thought, the developmental process cannot be divided so sharply into stages as the continental investigators think, and that there is an intimate relation between the type of thinking and the situation that calls forth that thinking. Even young children show a high degree

of socialized thinking, of abstract thinking, and of logical thinking in some situations and a low degree in others. Some four- and five-year-old children show quite as much capacity to make generalizations as do some fifteen- or sixteen-year-old children. Even adults who have developed mature types of thought revert to egocentric, synergistic, and primitive types of thought when presented with problems well beyond their level or lying outside the subject matter in which they have been trained or have had experience. The problem of the development of logical processes is, then, much more complex than was formerly supposed. There is, moreover, a strong suggestion in the literature that the social or environmental context has a marked influence upon the type of thinking revealed; thus, young American children show less egocentric and more logical thinking than do young French children, and in Poland rural children show much more primitive types of thinking than do city children.

It is clear, then, that no absolute generalizations can be made with respect to stages of development in thought, nor can we say that the capacity to generalize or to show insight is completely lacking at any level. The teacher should not approach the child with a concept of stages; rather she should evaluate her teaching techniques and material, in order to present to the child, from his very first experiences in school, opportunities for problem-solving or reasoning that are appropriate to his level and that will stimulate him to demonstrate the abilities he possesses.

6. Emotional Growth

Pervading all the reactions of the child and furnishing the background of many of the most important aspects of his personality and adjustment are the emotions and the feelings. So important are they that a special treatment of their relation to the curriculum is to be found later in Chapter XVIII. Here only a brief and general summary will be given.

At times the infant is calm and placid, at other times he is excited; on some occasions he gives every evidence of delight and on others unmistakable evidence of distress. As he grows older, fear, anger, love, disgust, and a whole host of other emotions will be differentiated. He will show marked attachment for some persons and objects and dislike for others. He will meet some situations calmly; others, so tensely that his behavior will be disorganized. On some occasions he will be keyed up, enthusiastic, energetic, and on others even the most strenuous appeals on the part of parents and teachers will fail to move him.

We can distinguish between two types of emotion. First, there are the exciting emotions, such as fear, rage, jealousy, and so forth, which can be viewed as emergency reactions to situations that the child is not quite prepared to meet on the basis of his experience. Second, there are the milder emotions, attitudes, sentiments, and feelings that pervade the entire behavior of the child and grow out of his previous experience.

An exciting emotion arises whenever the child is blocked or thwarted. The internal tension created results in overt attempts to meet the blocking or thwarting situation by energetic behavior directed toward or away from the stimulus. The internal tension disappears when the child develops behavior that meets or avoids the situation. In infancy and early childhood the primitive and undifferentiated excitement is differentiated into a number of specific emotional reactions that are described by such terms as fear, anger, jealousy, negativism, love, and the like. By the time the child enters school he has developed characteristic emotional expressions and possesses varied methods of showing and controlling his emotions. Differentiation continues at a slower rate during later childhood and the adolescent period.

From the standpoint of training it is important to recognize that in an emotional reaction of the exciting type, the child is facing a situation for which an adequate response is lacking. Much of his behavior springs from an attempt to develop a solution by running through a repertoire of action in order to organize a method of meeting the situation. When such a method is acquired, the situation no longer produces excitement. A distinction must then be made between expert, smooth-running, non-emotional behavior, which indicates effective adaptation, and the tense, exciting, emotional behavior, which indicates that adjustment is in process.

Some emphasis must be placed on the manner in which emotions are affected by factors, both internal and external, other than those involving direct stimulation. Temper tantrums vary with the physical state of the child, with toxic conditions, and with the tenseness of the adults who are present. Often tantrums can be eliminated or reduced if a thorough-going analysis is made of the relation of the child to his environment, whereby the need of specific methods of control may be obviated.

From the practical standpoint the most significant emotional states are those of fear, anger, jealousy, negativism, and love. In anger the reactions of the child are directed toward the thwarting or blocking situation; in the case of the temper tantrum there is an undirected

display of energy of a very primitive sort. Temper tantrums occur most frequently in two-year-olds, gradually decrease in frequency as the child grows older, and usually disappear by the time he enters school. The time of disappearance is determined by the type of training the child receives. Ignoring, isolating, or not giving in are more effective methods of eliminating temper tantrums than are spanking, threatening, or giving the child what he wants. Negativism, or refusals, are likewise marked in two- and three-year-old children and typically disappear by five or six years.

Fear reactions are present throughout the whole developmental period, but show some decrease in frequency as age increases. The infant shows marked fear of loud noises and of strangers. Young children are likely to show fear of dogs and strange animals. With development there is a change in the stimuli that characteristically elicit fear. The seven- or eight-year-old child is very responsive to the dangerous and thrilling situations of motion pictures, whereas the sixteen- or seventeen-year-old has developed more control and shows less emotional response. Fear reactions increase in frequency whenever the child is faced with a new situation or moves from a zone of life in which he has become habituated to one that presents new problems and relations. There is always a question whether or not it is the newness or strangeness of the stimulation, rather than its intrinsic character, that produces the fear reaction in children.

Fears may be set by a single intense experience, by repetition of many unfortunate experiences, or by examples of fear behavior shown by older persons in the presence of the child. Considerable care should be taken in developing techniques for removing fear. In general, the most satisfactory procedure is that of training the child in an effective mode of action that will reduce tension. It is not our task in this summary to describe in detail the methods for controlling fear. Readers are referred to longer and more adequate discussions of the subject.

Jealousy is an emotion that is displayed most frequently in the pre-school years, though it is still present in some school children. Many children show no evidence of jealousy and in most instances it is the result of an unwise distribution of affection and attention among the members of the family.

The emotion of love shows a characteristic developmental pattern. In infancy the child's attachment centers about his parents. Gradually attachments for other members of the family appear. In the early school years, attachments are made largely with persons of the same

sex; that is, boys become friendly with boys and girls with girls. In the period of adolescence both boys and girls develop a strong interest in the opposite sex as well as in their own.

So far we have emphasized the exciting emotions that further the adaptation of the child to emergencies. But the school is equally concerned with the sentiments, the attitudes, the enthusiasms, and the attachments of the child for all manner of objects, activities, skills, and situations. In general, these attachments are the product of the concrete experiences of the child, and become more specific with increasing age. It is not the function of the school to educate emotion out of the child, but rather to encourage positive attitudes and enthusiasms and to build up in the child a capacity to discriminate that will enable him to manifest emotion in socially desirable ways. With the question of values, we cannot here concern ourselves, but we can point out the importance of including in the educational program some provision for education of the emotions.

7. Social Development

The importance of social development and the establishment of an appropriate environment for developing the social reactions of the child are becoming of increasing concern, for it is obvious that an individual must live in close relationship with other persons and be dependent upon them in large measure for his success and happiness. The school is an organization in which many children are brought into social relations. The clear recognition of the socializing function of the school is important for the development of educational procedures and for meeting the child's basic needs.

In infancy the child is primarily concerned with himself. But he quickly learns to smile when his mother comes toward him, to distinguish between the sound of human voices and the sounds made by other objects, and to show more interest in the sounds made by human beings. If young children are brought together in groups at the age of two or three years, the striking characteristic of their social behavior is called 'parallel, or solitary, play.' Essentially the children go off by themselves and maintain independent activities without evidence of true social contacts. By the age of three and one-half years, interest in other children has developed to such a degree that many rudimentary social activities are appearing. The child becomes interested in what other children do to him and finds that other children will on occasion coöperate with him in a joint project. By the age of five years evidence

of coöperative play is very marked and there is some tendency to form social groupings.

In connection with the child's progress from the parallel play of his early years, through the coöperative play of the early school years, to the socially organized activities of later childhood and early adolescence, it may be pointed out that the child gets an amazing amount of practice in social situations, for he is with other children and other persons much of the time. He not only becomes aware of his own social 'stimulus value,' but he also experiments with methods and techniques, some good and some poor, in meeting other people. This social trial-and-error process is important because any group of social reactions that persists into late maturity has been tried in a wide variety of situations and is the product of a long course of practice. Clear examples of this trial-and-error behavior and of this selective process are furnished not only in the studies of young children, but also in the studies of older children, particularly those dealing with the effects of motion pictures upon children's behavior.

In addition to opportunities for observing the effectiveness of his own social behavior in influencing the behavior of others, the child receives from other individuals much direct instruction in social behavior. This includes specific comments on his social acts, general precepts, and formal or informal instruction in the 'rules of the game.' To these must be added the examples furnished by older persons and the child's direct observations of the effects achieved by adults and by other children in their own social contacts.

In early childhood the *games* played by children are largely individual in character. At about the age of six they begin to exhibit rotation; each child in turn takes the responsibility of carrying through the activity by being 'it,' catching the other children, or doing a stunt, as in jumping rope. At about the age of nine or ten this rotating type of game is superseded by games in which there is some specificity of social function; one child is the captain, another the catcher, another the pitcher, and so on. Children come to recognize the capacity of their companions for various jobs, and encourage them in their attempts to compete for these positions. This increasing specificity in the selection of appropriate social tasks is carried still further in later adolescence and is a prominent feature of adult social adjustment. Involved in the recognition of this specificity of social function is also the recognition of the hierarchy of functions. While few specific data on the appearance of such recognition are available, casual observation indicates

that differences in social status and position begin to be recognized in the early school period.

When the *friendships* of children are examined, it is found that in addition to the tendency of young children to associate with those of the same sex and in adolescence to form associations both with their own sex and with the opposite sex, there is a definite relation between the characteristics of the child and the friends and associates whom he chooses. Children of the same age level tend to play together. Within that particular age level there is a tendency for brighter children to choose as their chums other bright children, the duller children to have dull chums; the physically strong tend to associate with the strong, and the weaker to associate with the weak. Very bright and physically well-developed children cut across the age divisions upward and play with children chronologically older than themselves, while the retarded and physically undeveloped cut across these divisions downward and play with younger children.

As children become older, their associates tend to be determined, not only by age, ability, and physical development, but also by common interests and needs. In adult life most social groupings are based on common interests and experiences.

Studies of the choice of boy and girl friends in adolescence tend to support the general principle that like selects like rather than unlike. Studies of the resemblances and differences between marital partners show the same principle at work. It thus becomes clear that the associations formed by children, although partially determined by incidental and accidental factors, are to a great extent selective in their character.

The form that social activity takes depends in large part upon the environment. Thus, children in an area of high delinquency tend to accept delinquency as normal and even desirable, whereas children in an area of low delinquency look upon the same behavior as abnormal and undesirable.

Certain other findings in connection with social development are of interest. It is, for instance, very difficult to control three- and four-year-old children by holding up older children or other children as examples. But by the age of five years the appeal to the performance of others may be an effective method of motivating both the individual and the group. The evidence seems to be rather clear that competitive tendencies appear at about five years, and that competitive and cooperative tendencies develop together.

The studies of *leadership* in children show that almost every child has opportunities to be a leader in some situations and a follower in other situations. The amount of practice received by children in leading or following varies greatly from child to child and depends in large part upon the physical, mental, and social characteristics of the child. Even at a very early age certain children stand out distinctly from the group by virtue of their capacity to direct and control others, and these children receive an amazing amount of practice in exercising such control, while others receive relatively little. Recent work shows that leader-follower and ascendancy-submission reactions in children can be modified through a considerable range by controlling the child's experience in the group.

Finally, it may be said that the social reactions the child shows are the products of his experience with adults and other children. They are set in part by example, demand, and instruction, and in part by the child's own experience in observing the manner in which other persons react to his social ventures and techniques.

8. The Development of Interests and Activities

In one sense, the course of development can be said to be a succession of interests, for the child comes gradually to direct his attention away from himself into an objective world and to manifest interest in one activity after another. At first these interests are fleeting; later they show more continuity; and finally, in late adolescence, they may become integrated into a permanent vocation or avocation.

The infant's interest is centered largely in the body and in objects that stimulate sensory surfaces. He plays with his toes and his fingers, and enjoys a rattle that can be fondled, bitten, pushed, pulled, and shaken. For several years he will be exploring all manner of objects, trying to take them to pieces, running his hands over them, manipulating them, getting into every nook and cranny. These activities not only train his developing sense organs but also build up motor skills. This display of manipulation and curiosity increases during early childhood. With the development of language there comes the ability to inquire about objects, their origins, meanings, and so forth. As a result the child indulges in much verbal play, asks many questions, and acquires much information concerning the world about him. He also shows a strong tendency toward dramatic play; he imitates the actions of older persons, plays doctor and patient, mother and child, and the

like. He shows much imagination in his play, whether it takes an overt or a linguistic form.

With the entrance into school, interests developed around the school situation become more important. As the child gains skill in reading, he learns to like books, stories, and articles. Through contact with his fellows and older children, he learns the games played on the school playground. He develops a series of enthusiasms, spending much time for a few weeks on one hobby, and then turning suddenly to another. Sometimes parents and teachers become concerned over these sudden changes in interest. Such changes, however, are characteristic of the early years and, if children are watched for a period of years, it will be seen that with increasing age, interest in particular activities becomes more sustained.

Lehman and Witty found that children at the age of nine years have the widest range of interests and activities, and that with each succeeding year interests become more narrow and specialized. If they had measured the length of time that interests persisted, they would probably have found that, as age increased, each interest and activity persisted for a longer period of time. Gradually the child locates those activities from which he can secure some measure of satisfaction and in which he has some skill and can develop more. These he continues, while others that are neither satisfying nor productive of reasonable skill are dropped. The exploratory character of the child's ventures into the realm of interests and activities cannot be emphasized too strongly. He needs a broad base of opportunity, and he needs encouragement and patient treatment by adults, in order that he may find himself. It is well for us, then, to recognize the principle that a teacher who shows some capacity for enthusiasm and who has a rich background of interests of her own can do much to facilitate the child's process of self-discovery.

9. The Development of Character and Personality

The most general terms used to describe children's reactions are 'character' and 'personality,' both of which are so difficult to define that there is much disagreement as to their exact connotation. We may define a person's character as the effectiveness of his habits and behavior in fulfilling his own potentialities, both individually and as a member of society. Thus 'character' implies both continuity of action in working for remote, rather than immediate, goals, and the capacity to respond to social demands and to identify one's own purposes with

those of others. When we describe a person as of strong character, we refer not only to his capacity to meet conventional moral situations, but also to the fact that a certain continuity of pattern runs through his reactions to such situations.

Formerly it was thought that character traits were broad and general in nature, so that, for example, children could be definitely classified as honest or dishonest, truthful or lying, and so forth. Modern studies, however, show wide variation in the behavior of individual children and of groups of children as the situation to which they are exposed varies. The same child may be honest in one situation and dishonest in another situation; he may be truthful in one situation and untruthful in another. Thus, there is little evidence to support the contention that predictions can be made with a high degree of accuracy from the child's behavior in one situation to his behavior in another situation that is distinctly different. From the standpoint of character education the importance of this principle lies in its calling attention to the specific acts of the child, rather than to mythical 'character traits.' If we wish the child to be honest, we must give him both the opportunity to be honest and the gratification that comes from being honest in a wide variety of specific situations.

The young child's reactions are neither bad nor good in the moral sense. He tests numerous responses to numerous different situations and learns from his experience to identify those responses that are condoned by society and those that are condemned. The process of acquiring moral standards extends over many years and involves the child's experiences at home, in church, in school, and in contact with extra-community agencies, such as the radio, the newspaper, and the movies. If the total environment is sound, the child's behavior is likely to be of a high character. It may depart from that high character when a considerable number of unfavorable factors are present. The task of analyzing, of teasing out, these undesirable factors is a difficult one and demands the services of specialists in child behavior.

Modern research on character education adds weight to the traditional distinction between verbal behavior and overt behavior in concrete situations. Many times children know the rules of conduct without being able to apply them. Moreover, a program of character education that is essentially verbal may not be as effective as one in which the child has the opportunity to profit by experience in actual situations. There is also some discussion regarding the extent to which the child can generalize from one situation to another and the age at which

this capacity appears. Since the ability to generalize increases with age, we can expect the older child to make generalizations on moral conduct from isolated experiences more readily than the younger child. In any event, a broadly conceived program of character education approaches the child from many different angles. It involves some contact with precepts and codes, some experience in specific situations, and some training in generalizing.

If we observe the age trends in infractions of the moral code, it is clear that up to the age of nine or ten years infractions of legal significance seldom occur. But after this age there is a steady increase in the number of such infractions. It is not clear whether the increase at nine years is due to the fact that the child has matured to such an extent that his acts have social consequences to a much greater degree than formerly, or whether the tendencies to delinquency that have been shown mainly at home hitherto have gone undetected because they have not affected persons outside the home.

So far as practical procedures in the handling of children are concerned, it is clear that social sanctions and condemnations increase in efficacy as the child becomes mature. Obviously, more can be demanded and expected of older children than of younger children. A teacher can tolerate in a six-year-old child an amount of make-believe or imaginative lying that could not be tolerated in a ten-year-old child, and she can set a standard of truth-telling for a sixteen-year-old child that is higher than that for a ten-year-old.

So far as personality is concerned, we can say that its development is not entirely a matter of the individual, but depends upon the reciprocal relations between the individual and the group of which he is a part. We all contribute to each other's personality. There is a tendency among modern investigators to define personality as 'the social stimulus value' of a person, thus indicating that personality appears in our relations with others rather than in inherent characteristics. Whatever may be our point of view on this problem, it is clear that personality is a structure the child builds up in the course of his life on the basis of the many skills, abilities, attitudes, and experiences that have been discussed in the earlier portions of this section. It is a continuously changing structure, with a certain continuity running through it because these experiences cluster about one's physical and psychological entity. In this respect each personality is unique because it is composed of different elements or basic capacities that have been exposed to a different environment from the beginning.

The central problem so far as the child is concerned is to organize the training program, which includes the school, the home, the church, and his associates, in such a way that the child may become an integrated and wholesome personality rather than one that is broken, disintegrated, or disheartened by his contacts with life. On the one hand, the child is to be made responsive to social demands; on the other hand, the energy and motivations arising out of internal impulse must be preserved so that he will be able continuously to make a fresh attack upon his life's problems. Here lie major problems of mental hygiene. The teacher bears an important part in this picture. She should not be so concerned with her own prestige and importance that she tears down the personality of the children with whom she comes in contact. Rather, she should be the kind of individual who enhances the personalities of the children who come under her supervision. Contact with young minds should carry her forward in her own personal process of self-discovery and growth. For her, as for the children, zest, enthusiasm, a positive approach to life, and an enjoyment of the process of learning offer the best hope for the development of a well-rounded and wholesome personality that, on the one hand, will enable her to meet the inevitable stresses and strains of living, and on the other, will furnish a basis for enduring satisfaction in personal accomplishment and in effective contribution to the lives of others.

BIBLIOGRAPHY

ANDERSON, JOHN E. *Happy Childhood*. (New York: D. Appleton-Century Co., 1933, 321 pp.)

BAYLEY, NANCY. *The Development of Motor Abilities during the First Three Years*. Monographs of Society for Research in Child Development. Vol. I, No. 1, 1935, 26 pp.

BROOKS, FOWLER D. *Child Psychology*. (Boston: Houghton Mifflin Co., 1937, 600 pp.)

BROOKS, FOWLER D. *The Psychology of Adolescence*. (Boston: Houghton Mifflin Co., 1929, 652 pp.)

COLE, LUELLA. *Psychology of Adolescence*. (New York: Farrar and Rinehart, 1936, 503 pp.)

CONKLIN, EDMUND S. *Principles of Adolescent Psychology*. (New York: Henry Holt and Co., 1935, 437 pp.)

GESELL, ARNOLD, and THOMPSON, HELEN. *The Psychology of Early Growth*. (New York: The Macmillan Co., 1938, 290 pp.)

GOODENOUGH, FLORENCE L. *Developmental Psychology*. (New York: D. Appleton-Century Co., 1934, 619 pp.)

GREULICH, W. W., et al. *A Handbook of Methods for the Study of Adolescent Children*. Monographs of the Society for Research in Child Development. Vol. III, No. 2, 1938, 406 pp.

JERSILD, ARTHUR T. *Child Psychology*. (New York: Prentice-Hall, Inc., 1933, 462 pp.)

JONES, MARY COVER, and BURKS, BARBARA S. *Personality Development in Childhood*. Monographs of the Society for Research in Child Development. Vol. I, No. 4, 1936, 205 pp.

LEHMAN, H. C., and WITTY, P. A. *The Psychology of Play Activities*. (New York: A. S. Barnes and Co, 1927, 242 pp.)

MORGAN, JOHN J. B. *Child Psychology*. (New York: Farrar and Rinehart, 1934, 502 pp.)

MURCHISON, CARL (ed.). *Handbook of Child Psychology*. 2nd Ed. Revis. (Worcester, Mass.: Clark University Press, 1933, 956 pp.)

PIAGET, J. *The Language and Thought of the Child*. (Trans. by M. Warden) (New York: Harcourt, Brace, and Co, 1926, 246 pp.)

SHUTTLEWORTH, F. D. *The Adolescent Period, A Graphic and Pictorial Atlas*. Monographs of the Society for Research in Child Development, Vol. III, No. 3, 1938, 246 pp.

STODDARD, GEORGE D., and WELLMAN, BETH L. *Child Psychology*. (New York: The Macmillan Co, 1934, 419 pp.)

WHITE HOUSE CONFERENCE. *The Adolescent in the Family*. (New York: D. Appleton-Century Co, 1934, 473 pp.)

WHITE HOUSE CONFERENCE. *The Young Child in the Home*. (New York: D. Appleton-Century Co, 1936, 415 pp.)

SECTION II

DATA ON THE RELATION BETWEEN THE CURRICULUM
AND CHILD DEVELOPMENT

PREFATORY NOTE ON THE USE OF A CLASSIFICATION BY SUBJECT MATTER

CARLETON WASHBURN
Chairman of the Society's Committee

Advocates of an integrated, or organismic, or project, or activity, or developmental approach to education are liable to be shocked when they see that Section II of this Yearbook is divided according to the old subject-matter classifications. A casual scanning of the chapter headings and even of the data included may well lead to the belief that the Yearbook Committee is following traditional lines of thinking and is concerned primarily with the inculcation of separate packets of subject matter, and that its only concern with child development is to find out at what stage of a child's growth this inculcation can be most efficiently done.

The Committee wishes to make it clear, however, that despite the seeming necessity, in the present state of our knowledge, and the seeming desirability, from the standpoint of immediate use by teachers and school administrators in the present stage of school practice, for a subject-matter classification of available data, the Committee is entirely sympathetic with a much more integrated and organic approach in actual classroom situations than is implied by this classification of the data.

The Committee considered as one possible form of presentation the arrangement of the material horizontally, with a discussion of each successive level of child development, its needs, its interests, and its potentialities, followed by a discussion of the kind of school program, regardless of traditional subject-matter divisions, that would be suitable for each level. Such a presentation would call for a division of the continuous process of child development into a series of more or less artificially marked off segments, a description of the typical child at each 'level,' and an analysis of the type of experiences and learning activities suitable for each level. Such an arrangement would have some advantages — if there were research data to make it possible. But we do not have such data. We have general developmental data, unrelated to school experiences, and these have been summarized in

Section I. With the exception of some studies of children's interests, however, practically all studies dealing with the curriculum, even in the broadest sense of that word, have been made in connection with relatively isolated subject matter. This is perhaps unfortunate in view of the present tendency toward using large units of work, based on children's interests, and toward developing broad, inclusive outcomes. Criticism of the subject-matter divisions of the Yearbook may lead to research, which in turn will allow some future yearbook committee to organize its material without regard to subject-matter classifications.

Even if data for organizing this Yearbook on the basis of developmental levels were available, however, we would still be confronted by the facts that children in any group represent a wide range of levels, and that even an individual child is at different levels of readiness for various types of experience and learning. Mental age itself, as one limited measure of development, is a composite, and two children of the same mental age may be widely different in the specific functions that are averaged together to give the score on an intelligence test. Furthermore, development is gradual and continuous, and not a series of jumps from level to level. The boundary lines between levels would be at least as artificial as are the boundary lines between subjects.

The Committee is not, however, too much disturbed by the subject-matter divisions in this part of the Yearbook. After all, whatever the functional setting may be, whatever the integration with other 'subjects,' there are moments when a child is definitely ready for reading and needs definite reading skills. There are other moments when he is definitely figuring, and needs mathematical skills. There are moments when he is acquiring information and concepts that are mainly historical, or geographical, or scientific, as the case may be.

As has been pointed out in the introduction, and as will be pointed out from time to time in the various chapters, the Committee is fully aware of the fact that the learning of any specific thing in isolation is a very different matter from learning it in various contexts and relations. But just how far the seemingly most effective maturity level for learning a unit of subject matter is affected by various methods and various contexts can only be learned by establishing some sort of base for comparison. Such a base is found in some of the data on comparatively isolated learning. Further research will indicate, as time goes on, how different procedures and relationships will modify the conclusions reached by the study of subjects in isolation.

Again, let us point out that the question involved is not whether it would have been better for the various research workers in the past to have established a different kind of base by studying various units of learning in a definite matrix of experience and need. The fact is that they have not done so. Yet the data they have gathered can be of real use, both to future research workers and to the classroom teacher, who, after all, in the great bulk of our schools, is still teaching subjects.

Even in those schools having integrated programs or activity programs, there is a real value in knowing whether a skill or concept called for by a project is one the children can really grasp at that time or whether it is one for which more maturity is needed. Data bearing on this point, inadequate though they be, should be helpful to the teacher. They should prevent her from trying to force unready children to acquire skills, or concepts, or knowledge beyond their ability. And, conversely, they should help her to realize the potentialities of her children. They should not, of course, fix absolute limits. Some children will fail to come up to her expectations, others will exceed them, because no child's developmental pattern is ever fully known, and factors not known by even the best of teachers play their part in determining learning. But the more knowledge a teacher can have concerning the probable readiness of her children for an experience or for a unit of learning, the more effective her teaching will be. Even when we do not know specifically the optimal level for a given unit of experience or learning, data on the developmental process in general may be used to make our procedures more effective.

Research data bearing on the level of development necessary for effective learning are in no way antagonistic to informal, incidental, or integrated teaching. On the contrary, they contribute to such a program by helping the teacher not to expect of the children nor to lead them to expect of themselves, a degree of learning that calls for a higher level of development than they have attained.

From the standpoint of the teacher, the curriculum-maker, and the administrator, the consideration of the curriculum in relation to child development, subject by subject, has value. From the standpoint of the actual teaching process, however, a synthesis and a breaking down of classification barriers is often essential. The data available to the Yearbook Committee lend themselves to the preliminary analysis sug-

gested by the classifications in Section II.¹ The teacher will, however, wherever practicable, synthesize and interrelate these data in her actual classroom work with children.

¹ As explained in the Introduction, a chapter on science was planned for inclusion in this Section, and Professor Charles N. Pieper, of New York University, undertook to prepare it. Illness prevented his doing so, and the Yearbook Committee did not receive information to this effect until it was too late to make other arrangements. The consequent omission of this chapter is greatly regretted.—*Chairman.*

CHAPTER II

EDUCATION IN MOTOR ACTIVITIES¹

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This chapter is the first of three that deal with education in relation to the care of the body and the promotion of physical habits and skills. This treatment of the general subject of physical education is followed by Chapter III on health education and by Chapter IV on the establishment of routine habits in connection with eating, sleeping, elimination, and dressing in early childhood. These last named activities are treated separately by reason of the prominent place each occupies in the child's early training.

I. EARLY MOTOR DEVELOPMENT

In early infancy, motor education must perforce be suited to the child's own style and pace, for no other scheme will work. Studies of the development of early motor coördination by Gesell (30, 31, 32),² Shirley (82), Bayley (5, 6), Halverson (39), and McGraw (64) show that the rate and the pattern of early motor development are determined largely by intrinsic factors. Bayley (5, 6) has traced the motor development of sixty-one infants from birth to the age of three years. Selected items from her findings are reproduced in Table I.³ In a statement of the educational implications of findings concerning early motor development, Bayley (7) notes that "the impetus to this growth springs largely from within" and most of what can be done, educationally, to promote motor skills in the infant and young child consists

¹ The writer is indebted to many persons who offered helpful suggestions and submitted materials for this chapter. He is especially grateful to Dr. Norma Schwendener, Miss Dorothy La Salle, Dr. Nancy Bayley, and Dr. Anna Espenschade. Dr. John E. Anderson kindly made available a number of reports and translations that would otherwise have been inaccessible to the writer.

² Numbers in parentheses refer to the bibliography at the end of the chapter.

³ There are, of course, differences among individual children, not only with respect to the age at which a given item of behavior emerges, but also, to a lesser degree, with respect to the sequence of the various items.

in providing the child with opportunities to exercise and to practice his abilities according to his own interests, drives, and capacities. It

TABLE I.—AGE PLACEMENT OF SELECTED MOTOR-DEVELOPMENT-TEST ITEMS

(Adapted from Bayley's report of the California Infant Scale of Motor Development (6). The entire scale includes seventy-six items.)

Performance	Age Place- ment in Months	Performance	Age Place- ment in Months
Beginning thumb opposition	4.1	Walks downstairs alone; marks time	24.5
Partial thumb opposition	5.1	Jumps off floor; both feet	28.0
Sits alone 30 sec. or more	6.2	Stands on left foot alone	29.2
Complete thumb opposition	7.6	Stands on right foot alone	29.3
Partial finger prehension	7.8	Walks upstairs, alternating forward foot	35.5
Sits alone with good coördination	8.5	Walks tiptoe three meters	36.2
Fine prehension with pellet	9.3	Jumps from height of 30 cm.	37.1
Raises self to sitting position	9.4	Distance jump—10 to 35 cm.	37.3
Pulls to standing position	10.5	Distance jump—36 to 60 cm.	39.7
Walks with help	11.6	Jump over rope less than 20 cm. high	41.5
Sits down	12.5	Distance jump—60 to 85 cm.	48.4
Stands alone	12.5	Hops on right foot less than two meters	49.3
Walks alone	13.0	Walks downstairs—alternating forward foot	50.0
Walks upstairs with help	20.3		
Walks downstairs with help	20.5		
Walks upstairs alone; marks time	24.3		

might be possible, in some instances, with great patience and expenditure of time, to speed the child's progress in certain developments, but the effort would hardly be worth the trouble, and in some cases might lead to more irritation than progress.

During the first few months of life, very simple provisions will suffice. "A crib with a sufficiently firm and resistant mattress will allow the infant to turn, twist, roll over, kick and push with his feet, lift his head, etc. Bars on the side of the crib will afford objects to finger, to grasp and pull on — until eventually by about eight or nine months of age, the infant can pull himself to a sitting position." Clothing should

be limited to what is needed for bodily warmth, and should not restrict free movement; toys should be small enough to be grasped conveniently, but not so small that they can be swallowed or poked into the eye, nose, or ear; the child should have "things he can chew, manipulate and shake — such as a 'teething ring,' a rattle, a rubber doll."

By the age of nine months, more space for free activity is called for. A pen or warm, clean, draught-free, safe floor-space should be provided, with railings or chairs by which the energetic youngster can pull himself to standing. With room to creep and toys to creep after, early locomotion will be given ample opportunity to develop. With things he can grasp and pull himself up by, the one-year-old will gain the ability to stand and to walk as his level of maturity and his strength make it possible. Toys may include balls to throw, blocks to build with, nests of boxes that fit together, simple peg-boards. . . . After two years, nails and hammers and saws, with pieces of wood to work on, wagons to push and haul, a 'jungle-gym' to climb on, paint brushes and crayons — in short, all of the usual nursery school equipment — furnish materials for the development of motor skills.¹

Two noteworthy findings that have educational implications should be added. Bayley's studies have shown that during the first fifteen months of life there is a good deal of correspondence (a correlation of about .50) between motor abilities and mental abilities (as far as these can be differentiated and separately tested). "Success in one domain is often closely bound up with success in the other . . . and opportunities for free exercise and manipulation of toys promote growth in both mental and motor abilities" (7). After fifteen months, however, the correlations are low, although still positive. Further, motor skills have been found to be rather specific — there is not a very high relationship between scores in early motor abilities and the scores obtained later in a different array of skills. This suggests, Bayley points out, that it is doubtful whether an early advantage in motor skills will carry over, to any great extent, to later ages, although it is possible that "one advantage in early training in motor skills may be in building self-confidence in attacking new skills."

¹ Detailed recommendations of play materials suited to various age levels from birth to the age of fifteen years, selected from the point of view of children's interests and physical development, have been offered in a succinct paper by H. C. Washburne (90).

II. EXPERIMENTAL STUDIES OF THE EFFECTS OF SPECIAL EXERCISES AND TRAINING ON MOTOR PERFORMANCES

A study by Gates and Taylor (27, 29) is the forerunner of several experiments in which children who have received special exercises or training in motor performances are compared with control subjects. These studies, by virtue of their common character, are here treated together, even though they cover a wide age range. Several of these investigations have dealt both with mental and motor performances, but only the latter are considered here. In the study by Gates and Taylor, children aged four to six years received exercise, several times a week, for a period of six months, in tapping; at the end of that period, they somewhat excelled initially equivalent control subjects, but after an additional period of six months with no intervening exercise, the two groups were substantially equal. Gesell and Thompson (33) provided exercise in climbing and in handling blocks to one of two twins for a period of six weeks, beginning at the age of forty-six weeks. At the end of that time, conditions were made similar for both children. Within three weeks, the control child had made more progress than was made by the experimental child during the preceding six weeks of special training. Substantially similar findings have appeared in a study by Hicks (40) of the effect of exercise in hitting a moving target; in a study by Hilgard (42), in which two-year-old children received practice for a period of thirteen weeks in buttoning, climbing, and wielding a pair of scissors; in a further study by Hilgard (41), in which the twins studied by Gesell and Thompson (33) served again, at the age of about five years, in an investigation that involved three motor performances (ring-toss, cutting paper, and walking on raised boards); in studies by Jersild (47) of the effects of exercise on rate of movement as measured by tapping and on strength as measured by dynamometers; in observations by Shirley (82) indicating that children who receive special encouragement and coaching are not likely to acquire the ability to stand or walk alone at an appreciably earlier age than similar children who are permitted to develop at their own pace.

In all the foregoing studies, the periods of special stimulation were relatively short in duration (at most, six months). What would happen if longer periods of training, with varying techniques, covering a wider range of performances, had been employed, the data do not tell. Moreover, further information is needed as to the possible effect of abnormal deprivation of opportunity for spontaneous exercise. In a

study by Dennis (19), a temporary experimental policy of depriving infants of opportunities to exercise freely appeared to have a retarding effect on the early development of three activities; namely, reaching, sitting, and standing. It is possible, in the general field of motor development, that deprivation of opportunity to exercise potential abilities may have a more pronounced effect on the negative side than special training or opportunity will exert on the positive side.

A study by McGraw (64) not only confirms many of the trends that have appeared in earlier studies but also uncovers striking potentialities for the development of specific skills during infancy. One of a pair of twins received special training for a time and was compared with the other twin, whose training was deferred. Prolonged exercise during the first months of life did not materially alter the pattern or the rate of extinction of two reflexes (the grasp and the Moro), which normally recede after the first few months of life. Similarly, the sequences and the rate of development of elementary activities involved in pre-hension and locomotion were not materially changed. In the case of certain more specialized activities, however, outstanding changes were induced by training. The trained twin was able to roller-skate practically as soon as he was able to walk. At fourteen months he was very proficient. At this time he also made notable achievements in climbing up inclined boards. Further, by the age of seventeen months he was able to swim fifteen feet.

The skills that the trained child acquired did not, however, alter the underlying pattern of motor development; rather, they were grafted upon this pattern. Roller-skating capitalized upon the walking pattern, which, as noted, was not substantially different from the pattern exhibited by the control twin. Likewise, training in climbing began first when the child was still in the creeping stage and the climbing was grafted upon the creeping pattern; the child progressed mainly by gripping and pushing with his toes, as in creeping. This method changed as the walking pattern displaced creeping in normal locomotion. As the pattern of creeping receded, and as, coincident with this, the child lost some of his earlier power of gripping and pushing with his toes, and as his legs grew longer, his climbing came to depend relatively more upon his upper extremities — where before he mainly pushed with his toes, he now pulled with his arms. The exercise he had received in using his toes in climbing, and the remarkable skill that he had acquired, did not carry over, entire, to climbing at a later stage of development. (Even so, however, the child continued to be

superior to his twin, and to other children of his own age, after the walking pattern was established, and this superiority was still apparent when the child was almost six years old.)

In the case of swimming, the child at seventeen months (when training in this activity had to be discontinued) could paddle and hold his breath; he was not yet able, however, to lift his head to breathe while in the water, so that he could swim no farther than a single breath would allow.

The findings indicate that a given skill may be ripe for training while another is not. It was not until about six months after he had learned to roller-skate, for example, that the child was able to make much progress in propelling a tricycle. It may be added, incidentally, that later work with other children has confirmed the findings with regard to roller-skating, suggesting that this performance was not a freak, but could perhaps be acquired at this early age by children in general.

The fact that some performances studied in this investigation could be promoted at an early age to an almost phenomenal degree suggests that there might be many other specific skills that could be cultivated during early childhood. However, even if it were demonstrated that many accomplishments that conventionally do not appear until a child is from four to twelve years old actually could be established several years earlier, many questions could still be raised, including the question as to which skills might best be suited to the child's physical welfare and the further question whether intensive training in one activity might not involve neglect of other equally important learnings. And even if these questions were answered, there still would be the practical problem of the expense of time and effort that a large-scale program of raising standards of motor accomplishment in young children would involve.

Further incidental findings in McGraw's study may be noted: although the trained and the control twin were substantially similar with respect to the sequence and the rate of developments eventuating in ability to walk alone, it appeared that the trained child was superior to the other in his gait, carriage, and grace of movement while walking. This difference was still apparent, although to a lesser degree, when the children were almost six years old. Moreover, at the time when training was in progress, the trained child appeared to be generally superior in handling his limbs and his body in situations other than those in which he was specifically trained. It is possible, of course, that factors

other than training may have been responsible for this, but the difference is none the less suggestive.

In another line of experimentation, it was found in one study that special exercises and encouragement did not materially improve the ability of two- and three-year-old children to keep exact time to the accompaniment of music (48); in another study it was likewise found that 'practice' in a motor rhythm performance test did not produce a significant increase in the scores of children aged two and a half to six years (88). Experience with music at the preschool level may, however, promote a child's rhythmic responsiveness and encourage him to improvise rhythmical patterns and dance steps of his own (14).

The foregoing studies, apart from emphasizing the importance of the child's own pace and pattern of growth, are very limited as regards specific performances that may be ripe for encouragement at any given age. Moreover, the available data do not lead to general principles according to which it would be possible to predict — without actual experimentation — just which skills or performances, in a list from which one might choose, would be most likely to prosper with special training at a given age. The data do suggest some tentative generalizations. Among the generalizations, all of which need further examination, is, first, the principle that 'phylogenetic' activities are less likely to be modified by training than are certain 'ontogenetic' activities (64); second, that practice is less likely to influence 'basic capacities in terms of strength and speed' than to extend one's repertory of skills based upon such basic capacities (47); third, that practice is more efficacious in promoting complex operations than in promoting simple or elementary activities. The last-named generalization, which has been discussed by Anderson (1), and which is supported by Mattson's findings in a study of maze-learning and by Mirenda's (70) findings in a study of locomotor activities, is especially worthy of elaboration in further research.

III. MOTOR EDUCATION AT LATER DEVELOPMENTAL LEVELS: GENERAL CONSIDERATIONS

Up to three years, the business of motor development consists largely of establishing the basic activities involved in prehension and locomotion. After three years, the job becomes increasingly one of putting these capacities to use in the form of more specific performances and skills.

By this time, also, the child's ability to talk and to understand direc-

tions adds to the possibility of introducing specific directions as to how he might better his performance.

Results of systematic research concerning motor development beyond the age of three years, based upon a functional approach to the problem, and suggestive of performances or projects that might be encouraged at various levels of maturity, are rather meager. Most of the literature pertinent to the curriculum in motor education may be classed under certain general headings. There is a large literature showing age norms and trends in physical development, height, weight, skeletal measurement (*e.g.*, 3, 4, 83, 85), body proportion, and ossification (23). Studies in this field have been listed in reviews by Dawson and Stoddard (18), Meredith and Stoddard (68), Todd (85), and others. Statistical tables in these fields are instructive as far as they go, but it usually is difficult to translate them into concrete recommendations concerning educational activities best suited to a given stage of development. It should also be noted that, for purposes of guidance, measurements of such isolated characteristics as height and weight, or size of various parts of the body may be quite inadequate as compared with an inquiry into the pattern of growth exhibited by the individual child (84).

The literature also includes reports of extensive measurements of functional development, in terms of speed, strength, achievements at various age levels on items of motor tests, or performances involved in various athletic activities (10, 11, 16, 63, 71). Such tables give an indication of the average and the range of capacities at various age levels, but many of them are in terms of isolated activities, which do not translate themselves into recommendations regarding projects best suited to a given level of maturity. Another source of information may be found in the results obtained in studies of children's spontaneous activities at various age levels (17, 24, 26, 44, 60, 73, 81). Much of the work in this field has been conducted by means of check lists, on which children themselves indicate, as best they are able and willing to, the things they have been doing or the things they would like to do. Surveys of this character do not tell to what extent the favorite activities at a given age represent genuine developmental trends and to what extent they may be influenced by fortuitous environmental factors, customs that are imposed, lack of facilities, and so forth. Observations of children suggest, at least tentatively, that there may be a discrepancy between what children list as favorite activities and what they actually turn to when freed from conventions and left to choose

for themselves (73). For example, a group of ten- to twelve-year-old camp children, on entering, gave a high vote for baseball and a low vote for sand-play. During the following weeks, however, they showed much enthusiasm for the pastime of building elaborate structures with sand. It was also found that the children spent considerably more time in handicraft activities than would be expected from the check-list results.

Findings obtained through actual observation of children's activities and achievements during their free play are revealing, but the data from this source are limited, especially beyond the preschool age (8, 13, 66, 73, 79, 87, 89). Among other promising lines of investigation are studies of the genetic development of a given activity, such as throwing and catching a ball (93), of the achievements and choices of camp children when left free to select their own activities (73), of the age at which children, under planned social stimulation, with or without specific directions, show an interest and show progress in learning a skill, such as swimming (74), or various performances in the nursery school (38).

Information as to some of the things that are recommended or actually stressed in physical education programs at different grade levels can be obtained from manuals for teachers and from curriculum surveys (54, 55, 56, 57, 72). Information from these sources would no doubt be more useful if it included more by way of actual observation of what children do, not only in school, but, equally important, outside the school.

Certain trends that have general implications for education may be stressed. Among other things, research indicates that motor skills are decidedly specific (6, 28, 36, 91). Low correlations (usually ranging below .30) have frequently been found between scores in separate activities, such as throwing, climbing, and jumping. While correlations between various tests of strength tend to be considerably higher (ranging from .40 to above .80), there may be little relation obtaining between strength and speed (51). According to Wellman, this specificity holds true so generally at all age ranges that one should be very hesitant in talking about 'the motor ability' of the child. Rather, at present, it seems safer to talk about 'motor abilities' as a series of not highly related skills (91). It is possible, of course, that future research will uncover and define general factors in motor ability that will have practical implications for education. One reservation in connection with the specificity of motor activities arises from limited observations

that have been made concerning the effect of mastery of some skills on the attitudes with which a child will tackle others. In McGraw's study (64), the trained twin appeared to show more courage than his brother in venturing into new activities. The possibility that mastery of some skills may render the child more self-confident in attacking others has also been noted by Bayley (7). Whether this increased self-confidence is a direct or an indirect outcome is, of course, immaterial, from a practical point of view.

Another consideration is the general fact that after the basic co-ordinations have become established, a child's ability to *master and enjoy* a performance or a game that calls for motor skill usually is greater than his ability to *invent or discover* such performances on his own accord. For this reason, the policy of keeping hands off and of leaving the child free to work out his own enterprises may sometimes be anything but 'progressive education'; it may actually do the child a disservice,¹ not only from the point of view of his immediate welfare, but also from the point of view of the future. Moreover, when a child is interested in an activity, much can often be done by direct teaching to increase his skill, and thereby his enjoyment of it. On the basis of observation of elementary-school children, LaSalle (58) points out that concern with techniques, under good instruction, far from spoiling spontaneity and freedom of play, may be decidedly salutary. Attention to form may increase a child's satisfaction when it teaches him to do better than which he is already eager to do. Mastery of improved techniques, under the direction of a competent teacher, may in itself be highly enjoyable.

Another matter of general importance is the significance of motor skills from the point of view of the child's personality. Motor competence is by no means simply an end in itself: it is a decidedly important factor in the child's social and emotional adjustments from an early age. That remediable deficiencies in skill may be a bar to desirable social contacts among preschool children, and may be associated with fear and other undesirable emotional responses, has been noted in several

¹ Children themselves may vaguely sense this. In one nursery school, at the beginning of the morning, a four-year-old child led some of her companions up to the teacher and asked, "Well, what shall we do today?" When the teacher replied, "Why, do anything you like, just anything," the child insisted, "But you tell us what to do." In another group, it was observed that a veteran of two years in nursery school objected to going to school and was a 'problem' while there, until the teacher assigned definite projects that called for more skillful and purposeful use of tools and equipment.

studies. Promotion of skill has been found, for example, to help a child to overcome a tendency to be submissive and to take the back seat (45), and to improve upon his poise and competence when he meets with failure (52). Training in motor skills has also been found to be valuable as a method of overcoming children's fears (43, 49, 50). The manner in which lack of average motor interests and skills may be associated with many other unfavorable traits has been indicated in a study by Cowell of "actives" and "fringers" on the school playground at the high-school level (15).

In connection with this topic, it should further be noted that a child's failure to participate with his playmates in a motor activity, with consequent exclusion, to that extent, from social contacts with his fellows, may be due less to lack of actual or potential ability than to shyness and fear of making a poor showing. Beginning at the nursery-school level, and extending upward through all ensuing developmental levels, it can be observed that the first hurdle in venturing into a new activity is often the most difficult one. Judicious help and coaching frequently can supply the impetus to mastery and enjoyment of activities from which the individual shrinks when left to his own resources.

IV. THE PRESCHOOL YEARS

In nursery-school education — if in no other department of education — one might reasonably expect that the educational program would be based upon the outcomes of systematic research, since the nursery school has been the hand-maiden of a substantial portion of the research in child development. However, the practices in the nursery school based directly upon systematic research are rather limited in number. Certain general developmental factors are usually taken into account, such as the consideration that the younger the child is, the more the equipment that is supplied should provide opportunity for gross, rather than fine, muscular coördinations (although even this general rule is open to some question), that materials should supply means for the child to exercise his interests and capacities, and should serve the convenience of the child's limited attention span and his strong interest in make-believe.

In the sphere of motor education, most nursery schools show a good deal of similarity. As far as the school's resources permit, a number of standard items of equipment are provided. Many articles of this equipment have been appropriated from the kindergarten, with resulting duplication.

In many nursery schools, one finds a wide range of achievement, with here and there a two-year-old who does as well as some four-year-olds. Such variation may be due to genuine individual differences, but often in practical work with children it is found that when a child is backward as compared with his peers, it is through neither lack of ability nor of desire, but through lack of help and direction in attempting new projects. More adequate information is needed to suggest ways in which activities may be graded in difficulty or replaced by new activities as a means of avoiding mere repetition. A child will, to be sure, seek of his own accord to embroider an activity so that it continues to be a challenge (as when he cuts sharp corners, or scales steep grades, or grasps the handle bar with only one hand after he has mastered the rudiments of riding a tricycle; or slides backwards after having learned to go down the slide the usual way). But the nuances a child can thus add will be influenced by the facilities at hand and the customs of his group. From superficial observation, it often appears that conventional preschool practices and facilities are relatively more stimulating, and tap the child's potentialities more adequately, in the case of younger children than in the case of older ones (especially the older ones who have previously attended). Further research on this point is needed.

Wellman (91), McCann (61), and McCaskill (62) have traced the development of motor achievements during preschool years. Some of the results, as published by Wellman (91), are summarized in Table II. As Wellman points out (91, 92), a summary of norms of motor accomplishment, even if it were complete, would still leave many questions unanswered. In a study of the motor achievements of children aged four and upward, Antipoff (2) found that environmental background had an important influence. That accomplishments may vary considerably in different populations of children has also been shown in investigations that have utilized Oseretzky's motor tests (75, 76, 77, 78). Kemal (53) found, among other things, that in these particular tests boys and girls were very similar up to the age of nine, after which they diverged. Espenschade (20) found that children in a preschool group in this country exceeded Oseretzky's Russian norms on many items (such as throwing a ball, jumping over a rope, climbing and descending stairs). Further study is needed to explore factors underlying group differences, individual differences within groups, and uneven abilities within individual children, as well as to answer the general question as to the extent to which a given achievement is in-

TABLE II.—MEASUREMENTS OF SELECTED MOTOR ACHIEVEMENTS DURING PRESCHOOL YEARS

(Adapted, in abbreviated form, from McCaskill (62), as reported by Wellman (91). "Motor age" represents the age at which 50 percent of the children showed the accomplishment that is indicated, or superior accomplishment, while 50 percent exhibited an inferior performance. Based on tests of 98 children, aged 26 to 74 months, enrolled in preschools of the Iowa Child Welfare Research Station.)

Activity	Motor Age in Months		Activity	Motor Age in Months	
HOPPING	Both feet	One foot	SKIPPING		
1 to 3 steps	38	43	Shuffle	38	
4 to 6 steps	40	46	Skip on one foot	43	
7 to 9 steps	41	55	Alternate feet	60	
10 or more steps	42	60	WALKING ON ONE INCH PATH		
BALL PLAY	Smaller ball (9½ in. cir.)	Larger ball (16⅔ in. cir.)	No steps off	Straight (10 feet)	Circular (4½ ft. dia.)
Throwing	30	30	ASCENDING STEPS	37	45
4-5 feet	33	43	Mark time, without support	27	
6-7 feet	52	63	Alternate feet, with support	29	
10-11 feet	57	above 72	Alternate feet, without support	31	
12-13 feet			DESCENDING STEPS		
Bouncing			Mark time, without support	28	
2 hands, 4-5 feet	—	46	Alternate feet, with support	48	
1 hand, 1-3 feet	27	71	Alternate feet, without support	49	
1 hand, 4-5 feet	40	above 72	JUMPING	12 in.	18 in.
Catching (success in 2 or 3 trials)			With help	—	28 in.
Arms straight	37	34	Alone, with one foot ahead	27	36
Elbows in front of body	50	44	Alone, feet together	31	43
Elbows at side of body	—	68		34	46

fluenced by past experience and training, as distinguished from relatively more stable physical factors, such as strength, size, and bodily proportion.

The results obtained by Wellman and her associates (91) show changes with age not only in achievement but also in method of attack. In ascending steps, for example, 50 percent of children at 27 months marked time, with support (holding the rail or wall); at 29 months, the median child alternated his feet, with support; at 31 months, he alternated his feet, without support.

Preliminary results in an investigation by Gutteridge (38) likewise deal with the practical achievements of nursery-school and kindergarten children. The findings indicate, among other things, that practically all children who were studied were able to ride a tricycle and to use available slides (in the customary way) before the end of the third year of age (yet it is likely, under prevailing conditions, that the same children will be exposed to similar tricycles and similar slides in the schools they attend at ages four, and five, and perhaps six). Gutteridge likewise found that many three-year-old children in some schools had not only mastered the standard climbing apparatus provided for them, but had scaled everything provided for five-year-olds as well.

In studies by Updegraff (86) and her associates, the practice has been tried, among other things, of giving the older children a certain amount of instruction in the use of such equipment as the trapeze, rings, the horizontal bar, pole-climbing, and the like. The experiment is still in progress and specific recommendations are not yet available. Experimentation with activities that usually have not been stressed in the nursery school is not undertaken simply to teach the child a bag of tricks, but with an eye to the child's total development.

One incidental consideration in the facilities provided for young children is the matter of promoting balanced bilateral development. A study by Giesecke (34) reviews previous studies of the development of hand preference and presents original data. In many specific skills, it is economical eventually to give preference to the right or the left limb. However, over-specialization can become a handicap as well as a gain. Among the more simple means of encouraging a more balanced development would be the provision of such things as bannisters on both sides of a stair, boards that can be grasped at both sides, objects that perforce must be handled by both arms, tools suited to the hand or foot on one side as well as the other.

V. ELEMENTARY AND HIGH-SCHOOL LEVELS

Some of the considerations that apply to motor education as we move from kindergarten to the elementary schools have already been stated or implied. The value of motor education, as a separate discipline at the elementary-school level, consists to a large degree in what it can do to promote the child's social and emotional development. After the third year, as already noted, the choice of activities becomes more and more flexible and dependent upon the facilities and the stimulation provided. To be sure, the joint influence of growth and learning continues. Without specialized instruction, there are structural and functional changes as the child grows older. There are changes also in a child's intellectual and social interests. In the former sphere, for example, one finds motor activities adapted to a strong preoccupation with make-believe activities during preschool years and early elementary-school years. Further, with the growth of understanding come changing interests, increased capacity to comprehend and to enjoy more complex games. In the sphere of social behavior, from a period at the age of two, in which much of his social behavior is of a parallel or contiguous sort and when he has little active intercourse with others, the child progresses through a later period in his preschool and early elementary-school years in which he increasingly participates in group projects that involve a low order of organization. By the age of five years, according to experimental findings (37, 59), the basic pattern of rivalry in accomplishment has been established. By nine or ten, according to the limited available findings (12, 25), the average child is ready to join in organized team-work and to bend individual activities to fixed rules and the common purpose of members of a team. The advent of puberty, in turn, entails personal motives that influence the choice of a child's motor activities. A thorough study of motor development, with a view to practical recommendations for the curriculum, would involve a really ambitious program of confirming the sequences and stages that have been described in studies of the several related aspects of a child's growth.

Some of the developmental data pertinent to problems of curriculum-making for elementary and high-school grades have already been discussed. As already indicated, there is a decided need for more adequate information concerning children's spontaneous interests at various developmental levels and ways in which these interests might best be utilized. One outstanding trend in this field, as obtained by check-

lists, is the decided decline with age, from seven years to twenty, in the number of different play activities in which children engage. Many of the games that drop out as the child grows older consist largely of gross motor activities, which, although requiring considerable coördination or speed, are of a relatively unskilled character (such as playing horse, pom-pom-pull-away, run-sheep-run). Among other games that show a high degree of mortality with increasing age are make-believe activities (playing house, doll play, cowboys, cops and robbers). That such games should decline after they have served their purpose and yield to others calling for more skill or more organized team-work and competition is in keeping with the general trend of the child's motor and social development. However, in many cases there is a falling off also in conventional games that require considerable skill and organization. Beginning at about the high-school level, many children shift increasingly from the rôle of participator to that of spectator, especially in such sports as baseball, soccer, and football.

TABLE III. — AVERAGE SCORES OBTAINED BY FIVE-, SIX-, AND SEVEN-YEAR-OLD CHILDREN IN VARIOUS MOTOR PERFORMANCES

Adapted from Jenkins (46)

Activity and Measure Used in Scoring	Age Groups					
	5 Years		6 Years		7 Years	
	Boys	Girls	Boys	Girls	Boys	Girls
35-yard dash — timed in seconds	9.30	9.70	8.52	8.84	7.92	8.02
Hop 50 feet without error — timed in seconds	10.82	10.33	9.20	8.89	8.81	7.59
Baseball throw at target — 10 ft. distance — error in inches	8.87	16.90	5.40	13.17	4.20	8.50
Baseball throw — distance in feet	23.60	14.50	32.80	17.80	41.40	24.40
Soccer kick — distance in feet	11.50	8.00	18.40	10.10	25.40	15.00
Standing broad jump — distance in inches	33.70	31.60	39.30	38.00	42.20	41.00
Running broad jump — distance in inches	34.40	28.60	45.20	40.00	58.80	50.80
Jump and reach — vertical dis- tance in inches	2.52	2.22	4.02	3.48	4.98	4.28

Many detailed standards of achievement in various motor performances, and especially in track events, have been compiled (11, 16, 71);

many such standards have been reviewed by Bovard and Cozens (10). Illustrative findings are shown in Tables III and IV. Table III is based on tests by Jenkins (46) of fifty boys and fifty girls at each age level from five to seven years. The subjects were public-school children, somewhat above normal in average I.Q. (the mean I.Q. was about 111). The original study should be consulted for details concerning the spread of scores at each age level. Table IV is based on a study by Goodenough (35) of simple reaction-time to a sound stimulus. Again, in the case of this table, the original study should be consulted for details, especially for data on the decrease with age in the variability of reaction-time scores.

Manuals dealing with courses of study in physical education outline activities, sports, and games that should be stressed at various grade levels (see, for example, 57, 72). The recommendations in such manuals have largely grown out of practical experience, influenced by precedent and tradition.

When recommendations for separate grades are examined, we find that many of these conform, in general, to the findings that have been made in research in the development of children, although, as Schwen-dener points out, it is questionable whether some of the activities, such as mimicry and 'round' games, that are recommended in the early grades, are particularly interesting to children (80).

TABLE IV.—MEDIAN REACTION TIME BY AGE AND SEX IN SIGMA UNITS (.001 SECOND) AS MEASURED BY THE MILES REACTION-TIME BOARD (69)

From Goodenough (35) *

Age	Boys	Girls	Age	Boys	Girls
3½	492	518	8½	223	249
4½	356	424	9½	218	202
5½	311	356	10½	229	229
6½	259	286	11½	192	192
7½	260	250	College		
			Students ..	172	172

* Reproduced, by permission, from the *Journal of Experimental Psychology*.

The following trends may be noted. In the early grades, the games that are recommended involve a good deal of running, chasing, dodging, jumping, and balancing (tag, Jack-be-nimble, puss-in-the-corner, drop-the-handkerchief), with more stress on large movements of arms and legs and trunk than on refined movements of fingers, or wrist, or toes,

and involving competition of a sort that permits each child a good deal of freedom to play his own games within a general set of rules. In the third grade, and increasingly beyond this point, games calling for team-work come more to the fore, and there is increasing stress on finer coöordinations, such as hitting a moving target, rather than a stationary one, throwing and catching with one arm as against two, bringing the wrist and fingers and toes more into play in accurate throwing, catching, and kicking. Games that are recommended also follow increasingly complex rules. Some courses of study, likewise, stress mimetic activities and games with a strong element of make-believe (such as cat and mice, hare and hounds, run-sheep-run) in early grades, while in later grades these yield to a larger stress on competitive sports, individual stunts, and gymnastics.

Evidence of systematic research as to the placement of various games and sports according to age levels is largely lacking. Surveys of what various schools stress in the physical education program as a whole, and the grade level at which given projects are emphasized, show wide variations (54, 55, 56). It is not unlikely that courses of study, frequently copied one from another, have helped to establish conventions in children's play that might not prevail if the pressure of custom were relaxed. On the one hand, it is possible that children could learn and enjoy many of the standard games at an earlier age than is customary. On the other, it is likely that many games and activities considered appropriate to an early age level would continue to be popular through later ages were it not for the pressure of conventions (73) — witness, for example, the enthusiasm of adults on the beach or at a picnic for many games that are common in the first grades of school.

There is a decided dearth of detailed information regarding children's capacity for learning and enjoying specific feats and skills. Swimming, for example, is usually not encouraged until after the age of seven or eight, yet, where facilities are available, it can be mastered considerably before that time. Influenced largely by lack of facilities, some schools offer swimming in the first grade, others not until high school, others not at all. Children have learned to swim as early as the third year, when subjected to special training. As noted above, a child in McGraw's study (64) swam the distance permitted by a single breath by the time he was seventeen months old. The matter of keeping afloat should, if anything, be easier for the younger child by reason of his greater proportion of fat to total weight, and his shorter

legs. The coördinations involved in form swimming, however, as against the dog paddle, seem to come more readily to a child above the age of five years. The average child apparently will readily learn to swim, without special pressure, at about the age of five and a half years. Observations by Osborne (74) in a summer camp, enrolling children from one to eleven years, are instructive. All children above five and a half years learned to swim sixty feet or more within from four to six weeks, when exposed to the water during two twenty-minute periods a day (with no formal instruction and only a small part of the time spent in informal instruction). Although children below five years were similarly exposed, and were living in a situation conducive to swimming, few of them learned, and the few who did seldom swam more than fifteen feet at a stretch. The younger children showed less interest in attacking the job of swimming than did the children above five. They would splash, play in the water, and sometimes go through the arm motions of swimming while keeping one or both feet on the bottom. There were several indications that if pressure and training had been brought to bear, many children could have made much progress before the age of five years in this particular group, but it was not until the period from the fifth to the sixth birthday that the children appeared to be ripe for swimming of their own accord.

These findings regarding swimming are presented as tentative only. That the ability to swim may, under other circumstances, be developed considerably earlier than appeared in this study is suggested by Mead's observations of the Manus children in New Guinea (67). These children play in the water from early infancy, and "There is not a child of five who can't swim well" (67, p. 30). Although Osborne's findings (74) are tentative, they are none the less suggestive. Swimming happens to be a skill that is valuable both for pleasure and for safety throughout life. In contrast, many performances that children undertake by virtue of prevailing customs or school requirements are used relatively little in later years. Only a very small number of persons, for example, continue to utilize, to any substantial degree, the skills they acquire as children in baseball,¹ football, and soccer, or the

¹ Baseball, for example, has a strong position in American mores. It figures largely in the physical education programs of many schools from the third or fourth grade through college. In connection with baseball, LaPorte and Brownell, in a report of the Curriculum Research Committee, offer the following: "The real educational values of such an activity, after a few years of exposure to it, certainly

stunts they have learned in the gymnasium. This fact need not, of course, condemn these activities, for it should be enough if they supply good exercise and amusement during childhood, and occasionally in later years. However, as between skills that are distinctly limited in their application and skills that can conveniently be employed and have substantial value throughout life, much could certainly be said for emphasizing the latter. A critical examination of the physical education curriculum from this point of view would no doubt be valuable. It might also be pertinent to raise other incidental questions: To what extent is the usual course of study in physical education, and in recreational programs, influenced by professional sports, in which only a few persons eventually will participate? To what extent is it influenced by a traditional view as to what constitutes work and what constitutes play? Activities that could serve as a form of play and yet have ulterior values as well, such as hiking, pursuits in the field of natural history, woodcraft, caring for plants and animals, landscaping, building, and so forth, are many. On another point, it may be stated that there is little systematic evidence regarding the claims sometimes made concerning the value of athletics in the promotion of honesty, sportsmanship, and similar values.

Sooner or later, as children advance toward high school, the problem arises as to what to do in adapting the program from the point of view of sex differences. The problem of sex differences, and to what extent such differences are due to nature, to what extent to nurture, is a perennial one, and cannot be disposed of here. Sex differences in children's interests appear at an early age — even as early as preschool years. Solely from the point of view of physical development and anatomical differences, it is questionable whether separate programs for boys and girls are indicated until at least the age of ten or thereabout. Sex differences beginning with preschool years have been found in some motor performances, but not in all. In general, the differences favor the boys, but this is not uniformly true (see, for example, Tables III and IV). The practical standards of achievement in physical education programs usually recognize sex differences by way of separate norms for boys and girls, beginning in the early elementary grades (10, 11, 16, 71). As noted earlier in this chapter, the scores of boys and girls on the Oseretzky scale were found to be very similar up to the age

must be very small, at least in comparison with the possible contributions of other new activities" (56).

of nine years, after which they diverged (53). Further investigation is needed, not only to define general trends in sex differences, but also, and more especially, to determine the extent to which such differences may be due to 'nurture' rather than to 'nature.'

Suggestive findings on the subject of sex differences are offered by measurements made by Espenschade (22) in connection with the Adolescent Study of the Institute of Child Welfare of the University of California (51a, 84). Boys and girls were tested at six-month intervals beginning in the eighth grade and continuing through the junior-high-school period. In the case of girls, mean scores showed a small, but steady, *decline* in the dash and broad jump over a two-year period, and an equally small, but constant, increase in distance throw and the Brace Test. Boys, on the other hand, during the same period, showed an increase in all these activities, small in the case of the dash, but large in the case of the other three tests. In other words, ninth-grade boys are, according to these results, superior to eighth-grade boys, while eighth- and ninth-grade girls do not differ significantly. (This, of course, is in terms of mean performance; the difference between the means may, of course, be considerably smaller than the differences between a good performer in the lower grade and a poor performer in the higher grade.) Espenschade points out that the difference between boys and girls increased at every half-yearly interval during the two-and-a-half-year period, and voices the opinion that at the junior-high-school level there are few group sports in which the average girl can compete with the average boy on even terms.

The children in the above investigation were also studied from the point of view of their after-school sports (21). It was found that girls who scored high in motor tests were decidedly more likely to participate in after-school sports than were the girls who scored low. Espenschade points out that many factors are at work in producing these outcomes, but whatever these factors may be, the facts still raise a practical problem, for the benefits to be derived from after-school sports providing "moderate physical activity in congenial groups" certainly "should be as great for those of low ability as for those with average or high ability," and she raises the question (which the available data do not answer) as to how the non-participants might be led, voluntarily, to participate in activities that would give them adequate skills for enjoyment of some type of outdoor recreation that might be useful in adult life.

VI. SUMMARY

The foregoing account of findings pertinent to motor education reveals many promising research trends and points the way to a number of fruitful lines of inquiry, both by way of systematic research and by way of informal experimentation of a practical sort. On the one hand, the findings emphasize the primary rôle played by the child's own pace and style of motor growth during early years of life; on the other hand, they also indicate striking potentialities for motor education, at least in some skills, during infancy. At the preschool level, the findings suggest that the customary provisions for motor education in nursery schools and kindergartens have perhaps become too stereotyped and that the customary facilities present a greater stimulus and challenge to children aged three or less than to children aged four or more. The limited amount of evidence on this point is much in need of supplementation and further elaboration, as is the significant evidence that indicates the important rôle that motor skills may play in the child's social and emotional adjustments from infancy through later years. At all developmental levels, the available evidence indicates that useful findings, at least for immediate practical purposes, are most likely to emerge from studies dealing with children's motor activities and interests in actual situations, as distinguished from inquiries based on pencil-and-paper inventories of children's interests, or piecemeal measurements of various aspects of children's physical and physiological development. Measurements of the latter sort obviously are of value, as are norms based on tests of isolated athletic feats and skills at various age levels, but for educational purposes such measurements become most meaningful when integrated with a study of children in action in the situations of daily life, coupled with due regard for the interplay of the child's motor activities and his social and emotional characteristics.

BIBLIOGRAPHY

- (1) ANDERSON, J. E. "Child development and the interpretation of behavior." *Science*, 83: 1936, 245-252.
- (2) ANTIPOFF, H. "The evolution and the variability of psychomotor functions." *Arch. de Psychol.*, 21: 1928, 1-54.
- (3) BALDWIN, B. T. *The Physical Growth of Children from Birth to Maturity*. (Iowa City: University of Iowa Studies, Studies in Child Welfare, 1: No. 1, First Series No. 50, 1921, 411 pp.)
- (4) BALDWIN, B. T., et al. *Anatomic Growth of Children*. (Iowa City: University of Iowa Studies, Studies in Child Welfare, 4: No. 1, 1928, 88 pp.)

- (5) BAYLEY, N. *The California First Year Mental Scale*. (Berkeley: University of California Press, 1933 24 pp.)
- (6) BAYLEY, N. *The Development of Motor Abilities during the First Three Years*. (Washington, D. C.: Society for Research in Child Development Monograph No. 1, 1935, 26 pp.)
- (7) BAYLEY, N. Privately communicated. 1937.
- (8) BENJAMIN, H. "Age and sex differences in the toy preferences of young children." *Ped. Sem. and Jour. Genet. Psychol.*, 41: 1932, 417-429.
- (9) BOARD OF EDUCATION, Division of Physical and Health Education, Grover W. Mueller, Director. Philadelphia.
- (10) BOVARD, J. F., and COZENS, F. W. *Tests and Measurements in Physical Education*. (Philadelphia: W. N. Saunders Company, 1930 364 pp.)
- (11) BRACE, D. K. *Measuring Motor Ability*. (New York: A. S. Barnes and Company, 1927. 138 pp.)
- (12) BÜHLER, CHARLOTTE. "The social behavior of children." (In Carl Murchison, editor. *Handbook of Child Psychology*. Worcester: Clark University Press, revised ed., 1933, pp. 374-416)
- (13) CHASE, J. H. "Street games of New York City." *Ped. Sem.*, 12: 1905, 503-504.
- (14) CHRISTIANSON, HELEN. *Bodily Rhythmic Movements of Children in Relation to Rhythm and Music*. (Unpublished. New York: Teachers College, Columbia University)
- (15) COWELL, C. C. "An abstract of a study of differentials in junior-high-school boys based on the observation of physical education activities" *Res. Quart.*, 6: 1935, 129-136.
- (16) COZENS, F. W., TRIEB, M. H., and NEILSON, N. P. *Physical Education Achievement Scales*. (New York: A. S. Barnes and Company, 1936. 155 pp.)
- (17) CROSWELL, T. R. "Amusements of Worcester school children." *Ped. Seminary*, 6: 1899, 314-371.
- (18) DAWSON, H. L., and STODDARD, G. D. "Physical growth from birth to puberty." *Review of Educa. Research*, 3: No 2, 1933, 130-149.
- (19) DENNIS, WAYNE. "The effect of restricted practice upon the reaching, sitting, and standing of two infants." *Jour. Genet. Psychol.*, 47: No. 1, 1935, 17-32.
- (20) ESPENSCHADE, A. S. *An Experiment in Testing the Motor Ability of Preschool and Kindergarten Children*. (Wellesley: Wellesley College, Bulletin of the Mary Hemenway Alumnae Association of Graduate Department of Hygiene and Physical Education, 1932-1933)
- (21) ESPENSCHADE, A. S. *The Relation of Motor Ability of Junior-High-School Girls to Participation in After-School Sports*. (Unpublished. University of California, Institute of Child Welfare)
- (22) ESPENSCHADE, A. S. *A Study of Motor Ability of Junior-High-School Children*. (Unpublished. University of California, Institute of Child Welfare)
- (23) FLORY, C. D. "Osseous development in the hand as an index of skeletal development." (Washington, D. C.: Society for Research in Child Development Monograph 1:4, 1936. 141 pp.)
- (24) FOSTER, JOSEPHINE. "Play activities of children in the first six grades." *Child Development*, 1: 1930, 248-254.

(25) FURFEE, P. H. *The Growing Boy*. (New York: The Macmillan Company, 1930. 192 pp.)

(26) FURFEE, P. H. "Pubescence and play behavior." *Amer. Jour. Psychol.*, 41: 1929, 109-111.

(27) GATES, A. I. "The nature and limits of improvement due to training." *27th Yearbook of this Society*, 1928, 441-461.

(28) GATES, A. I., and SCOTT, A. W. "Characteristics and relations of motor speed and dexterity among young children." *Ped. Sem. and Jour. Genet. Psychol.*, 39: 1931, 423-454.

(29) GATES, A. I., and TAYLOR, G. A. "An experimental study of the nature of improvement resulting from practice in a motor function." *Jour. Educ. Psychol.*, 17: 1926, 226-236.

(30) GESELL, A. *Infancy and Human Growth*. (New York: The Macmillan Company, 1928. 418 pp.)

(31) GESELL, A. *The Mental Growth of the Pre-School Child*. (New York: The Macmillan Company, 1925. 447 pp.)

(32) GESELL, A., and THOMPSON, H. *Infant Behavior*. (New York: McGraw-Hill Book Company, Inc., 1934. 343 pp.)

(33) GESELL, A., and THOMPSON, H. "Learning and growth in identical infant twins." *Genet. Psychol. Monographs*, 6: 1929, 1-124.

(34) GIESECKE, MINNIE. *The Genesis of Hand Preference*. Washington, D. C., 1936. 102 pp. (Society for Research in Child Development, 1: 5, 1936)

(35) GOODENOUGH, F. L. "The development of the reactive process from early childhood to maturity." *Jour. Exper. Psychol.*, 18: 1935, 431-450.

(36) GOODENOUGH, F. L., and SMART, R. C. "Interrelations of motor abilities in young children." *Child Development*, 6: 1935, 141-153.

(37) GREENBERG, P. J. "Competition in children: an experimental study." *Amer. Jour. Psychol.*, 44: 1932, 221-248

(38) GUTTERIDGE, M. V. *Motor Achievements of Preschool Children*. (Unpublished. New York: Teachers College, Columbia University, 1938)

(39) HALVERSON, H. M. "An experimental study of prehension in infants by means of systematic cinema records." *Genet. Psychol. Monog.*, 10: 1931, 107-286.

(40) HICKS, J. A. "The acquisition of motor skill in young children. I. A study of the effects of practice in throwing at a moving target." *Child Development*, 1: 1930, 90-105.

(41) HILGARD, J. R. "The effect of early and delayed practice on memory and motor performances studied by the method of co-twin control." *Genet. Psychol. Monog.*, 14: 1933, 493-567.

(42) HILGARD, J. R. "Learning and maturation in preschool children." *Jour. Genet. Psychol.*, 41: 1932, 36-56.

(43) HOLMES, F. B. "An experimental investigation of a method of overcoming children's fears." *Child Development*, 7: 1936, 6-30.

(44) HURLOCK, E. B. "Experimental investigations of childhood play." *Psychol. Bulletin*, 31: 1934, 46-67.

(45) JACK, L. M. "An experimental study of ascendant behavior in preschool children." (In L. M. Jack, et al. *Behavior of the Preschool Child*. Iowa City: University of Iowa, 1934, pp. 1-65)

(46) JENKINS, L. M. *A Comparative Study of Motor Achievements at Five, Six, and Seven Years of Age.* (New York: Teachers College, Columbia University, Contributions to Education, No. 414, 1930, 53 pp.)

(47) JERSILD, A. T. *Training and Growth in the Development of Children.* (New York: Bureau of Publications, Teachers College, Columbia University, 1931, 73 pp Child Development Monographs, No. 10)

(48) JERSILD, A. T., and BIENSTOCK, S. "The influence of training on the vocal abilities of three-year-old children." *Child Development*, 2: 1931, 272-291.

(49) JERSILD, A. T., and HOLMES, F. B. *Children's Fears.* (New York. Bureau of Publications, Teachers College, Columbia University, 1935, 356 pp. Child Development Monographs, No. 20)

(50) JERSILD, A. T., and HOLMES, F. B. "Methods of overcoming children's fears." *Jour. of Psychol.*, 1: 1936, 75-104.

(51) JONES, H. E., and Associates. *Inter-relationships among Motor Abilities.* (Berkeley: University of California Unpublished. Institute of Child Welfare Monograph)

(51a) JONES, H. E. "The California adolescent growth study." *Jour. Educ. Res.*, 31: 1938, 561-567.

(52) KEISTER, MARY E. "The behavior of young children in failure." (Pp 29-82 in Ruth Updegraff, *et al. Studies of Pre-School Education*, I. Iowa City: University of Iowa, 1938. 356 pp.)

(53) KEMAL, C. "Contribution to the study of Oseretzky's tests for motor development." *Arch. de Psychol.*, 21: 1928, 93-99.

(54) LAPORTE, W. R. "Eighth Annual Report of the Committee on Curriculum Research." *The Research Quarterly of the American Physical Education Association*, 7: 1936, 99-100.

(55) LAPORTE, W. R. "Report of the Committee on Curriculum Research." *Proceedings of the College Physical Education Association*, 37: 1933, 60-70.

(56) LAPORTE, W. R., and BROWNELL, C. L. "Report of the Committee on Curriculum Research." *Proceedings of the College Physical Education Association*, 36: 1932, 156-172.

(57) LASALLE, D. *Physical Education for the Classroom Teacher.* (New York: A. S. Barnes and Company, 1937. 209 pp.)

(58) LASALLE, D. *The Teaching of Skills.* (Department of Health and Physical Education, East Orange, New Jersey, Public Schools. Unpublished)

(59) LEUBA, C. "An experimental study of rivalry in young children." *Jour. Comparative Psychol.*, 16: 1933, 367-378.

(60) LEHMAN, H. C., and WITTY, P. A. *The Psychology of Play Activities.* (New York: A. S. Barnes and Company, 1927. 242 pp.)

(61) McCANN, K. *A Seriatim Study of Motor Achievements of Preschool Children.* (Unpublished master's thesis. Iowa City: University of Iowa, 1936. Pp. 94 ms.)

(62) McCASKILL, C. L. *A Study of Common Motor Achievements at the Preschool Ages.* (Unpublished master's thesis. Iowa City: University of Iowa, 1936. Pp. 112 ms.)

(63) McCLOY, C. H. *The Measurement of Athletic Power.* (New York: A. S. Barnes and Company, 1932. 178 pp.)

(64) McGRAW, M. *Growth: A Study of Johnny and Jimmy.* (New York: D Appleton-Century Company, 1935. 319 pp.)

(65) MANWELL, E. M., and MENGERT, I. G. "A study of the development of two- and three-year-old children with respect to play activities." (In L. Jack, *et al. Behavior of the Preschool Child.* Iowa City. University of Iowa, Studies in Child Welfare, 9: No. 3, pp. 67-111)

(66) MATTSON, M. L. "The relation between the complexity of the habit to be acquired and the form of the learning curve in young children" *Genet Psychol. Monogs.*, 13: 1933, 229-398.

(67) MEAD, M. *Growing Up in New Guinea.* (New York: William Morrow and Company, 1930. 372 pp.)

(68) MEREDITH, H. V., and STODDARD, G. D. "Physical growth from birth to maturity." *Review of Educa. Research*, 6: February, 1936, 54-84.

(69) MILES, W. R. "Correlation of reaction and coördination speed with age in adults." *Amer. Jour. of Psychol.*, 43: 1931, 337-391.

(70) MIRENVA, A. N. "Psychomotor education and the general development of preschool children: Experiments with twin controls." *Jour. Genet. Psychol.*, 46: 1935, 433-454.

(71) NEILSON, N., and COZENS, F. W. *Achievement Scales in Physical Education Activities.* (Sacramento: California State Department of Education, 1934. 177 pp.)

(72) NEILSON, N. P., and VAN HAGEN, W. *Physical Education for Elementary Schools.* (New York: A. S. Barnes and Company, 1930. 365 pp.)

(73) OSBORNE, E. G. *Camping and Guidance.* (New York: Association Press, 1937. 260 pp.)

(74) OSBORNE, E. G. *Observations of Children's Swimming Activities.* (New York: Teachers College, Columbia University. Unpublished)

(75) OSERETZKY, N. I. "A metric scale for the study of the motor ability of children." *Zsch. f. Kinderforsch.*, 30: 1925, 300-314.

(76) OSERETZKY, N. I. "Psychomotorik methoden für untersuchung der motorik." *Zeitschrift für Angewandte Psychologie*. No. 55-59. Leningrad, 1930.

(77) OSERETZKY, N. I. "Psychomotorik: Methoden zur untersuchung der motorik." *Beihefte zur Zeitsch. f. ang. Psychol.*, 1931, 1-57.

(78) OSERETZKY, N. I., and GUREWITSCH, M. "Zur methodik der untersuchung der motorischen funktionen." *Monatschr. f. Psychiat. u. Neurol.*, 1925, 1-59.

(79) ROBERTS, MARY P. "A study of children's play in the home environment." University of Iowa Studies, *Studies in Child Welfare*, 8: 1934, 33-96.

(80) SCHWENDENER, N. *Child Development and the Physical Education Curriculum.* (Unpublished. New York: Teachers College, Columbia University, 1937)

(81) SCHWENDENER, N. *Games Preferences of 10,000 Fourth-Grade Children.* (New York: Teachers College, Columbia University, 1932. 49 pp.)

(82) SHIRLEY, M. M. *The First Two Years: A Study of Twenty-Five Babies. Vol. I: Postural and Locomotor Development.* (Minneapolis, University of Minnesota Press, 1931. 227 pp.)

(83) SHUTTLEWORTH, F. K. *Sexual Maturation and the Physical Growth of Girls Age Six to Nineteen.* Washington, D. C.: 1937. 253 pp. (Society for Research in Child Development Monograph 2: 5, Serial No. 2)

- (84) STOLZ, H., JONES, M. C., and CHAFFEY, J. "The junior-high-school age." *University High School Journal*, 15: January, 1937, 63-72.
- (85) TODD, T. W. "Growth and development of the skeleton." In *Growth and Development of the Child*. (New York: The Century Company, 1933. White House Conference on Child Health and Protection, Part II, Anatomy and Physiology)
- (86) UPDEGRAFF, R. Unpublished studies in nursery education. (Iowa City: University of Iowa)
- (87) VAN ALSTYNE, D. *Play Behavior and Choice of Play Materials of Preschool Children*. (Chicago: University of Chicago, 1932. 104 pp.)
- (88) VAN ALSTYNE, D., and OSBORNE, E. *Rhythmic Response of Negro and White Children Two to Six*. (Washington, D. C.: Society for Research in Child Development 2: No. 4, Serial No. 11, 1937, 63 pp.)
- (89) VANCE, T. F., and McCALL, L. T. "Children's preferences among play materials as determined by the method of paired comparisons of pictures." *Child Development*, 5: 1934, 267-277.
- (90) WASHBURN, H. C. "The right toy for the right age." *Child Welfare*, December, 1930, 1-7
- (91) WELLMAN, B. L. "Motor achievements of preschool children." *Childhood Education*, 13: March 1937, 311-316.
- (92) WELLMAN, B. L. "Motor development from two years to maturity." *Review of Educational Research*, 6: 1936, 49-53; 139-140.
- (93) WILD, MONICA. *The Behavior Pattern of Throwing and Some Observations Concerning its Course of Development in Children*. (Ph.D. dissertation. Madison. University of Wisconsin, 1937)

CHAPTER III

HEALTH AND SAFETY EDUCATION

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Experimental data regarding children's ability to acquire health information, to form health habits, and to build favorable attitudes toward health at various levels of maturity are meager. Most of the available evidence is at least once removed from direct experimental results. Prevailing practices suggest, but they do not give authenticity to, a wide range of placement of health subject matter.

I. INFANCY, PRESCHOOL AND PRIMARY-SCHOOL YEARS

In infancy and preschool years, health education can hardly be considered apart from other aspects of the child's development. The child grows if conditions are favorable. The primary task of health education during these years is to provide favorable conditions.

Mortality and morbidity statistics, and surveys of health habits and accidents show that adequate provision for health is lacking during these early years. Illness, in general, has been found to be most frequent under five years of age (5, 7).¹ It is well established that, even in the best-regulated nursery schools in different parts of the country, illness accounts for approximately one-third of the total absence (1, 6, 17). Compared with the common cold other illnesses are relatively insignificant as causes of absence. From one-half to three-fourths of the absences of nursery-school children who were in good physical condition to start with, and who had coöperative parents, were due to colds. Less than one-fifth of the absence was due to chicken pox, mumps, whooping cough, and other communicable diseases. In the same groups digestive disturbances, headache, and other causes of illness were negligible (1, 6, 17). More than half the deaths from diphtheria occur under five years of age. Whooping cough is even more fatal than

¹ Numbers in parentheses refer to the numbered references at the end of the chapter.

diphtheria in the preschool years (7). The committee report of the League of Nations (18) presents facts as to abnormalities of bones, adenoids, enlarged and septic tonsils, and badly formed or decayed teeth prevalent among children entering the elementary school.

Statistics of accidents show that more than one-third of the total number of deaths by falls and burns occur in the preschool years. The chief victims of food and drug poisonings are infants and children under five years of age (19). Study of the age of occurrence of various crippling diseases and conditions in one state (15) shows that a large proportion of the crippling occurs in the early age group.

Not only the deaths and physiological injuries, but also the psychological effects of disturbance of routine, and of pampering frequently accorded ailing children, demand that attention be directed to the prevention of the high incidence of illness and accidents at this age level. Parents and nursery-school teachers should receive instruction in health education that they can apply to their control of the environment and their treatment of small children. The children themselves are not aware that they are forming either good or bad health habits.

Unless a child is unwell, or unless special efforts have been made to impress upon him the importance of the subject, the average child below the age of puberty does not give much thought to health as compared with other interests. In a study in which children from the primary and the first six grades of school were asked to name three wishes, less than 10 percent of the wishes expressed dealt with matters directly pertaining to the child's own health or to the health of others. The wishes of this kind that did occur were scattered throughout the age range (16). Undoubtedly, a more intensive line of inquiry would reveal more interests related to health, but the available meager findings indicate that neither the average child's own firsthand experiences nor the cultural influences that surround him produce many well-defined health interests which the teacher can forthwith capitalize. One factor doubtless operating to the disadvantage of the development of concrete health interests in children is the comparative obscurity of the cause-and-effect relation involved in health. Without special instruction it would be difficult for the average child, merely through his own experience, to see the relation between germs and disease, or between such factors as poor nutrition or lack of sleep and later physical disorders. There is need for further study of the development of children's understanding of cause-and-effect relationships in the field of health.

The defects noted in the preschool years continue to be prevalent in

older children (18). Mortality statistics (4, 7) show that approximately one-fourth of the deaths from diphtheria occur between the ages five and nine. Measles and scarlet fever likewise have a high incidence in years five to nine. Obviously, facts concerning the prevention of these diseases constitute important health subject matter for primary-school children, but only experiential evidence is available as to the most effective form of instruction. Certainly the home must be taken into account in any genuine educational program for this field.

At the primary-school level, as parental supervision is relaxed, falls and automobile accidents tend to become more numerous than in the preschool years. They are, however, less frequent than in the later school years when children are under still less close adult supervision.

Mortality, morbidity, and accident statistics, while they indicate the need for certain kinds of instruction, do not show at which ages preventive measures can be most effectively taught. They do not even represent developmental stages, but rather the results of environmental factors and instruction. Thus, kindergarten children, who naturally would be subject to accidents, have a relatively low incidence because of special protective influences in their environment.

Health education, as it now prevails in the primary grades, consists chiefly of providing situations that will favor the development of good health habits and attitudes. In these grades, courses of study (14, 27, 35, 36) emphasize attitudes of courage, coöperation, consideration of others, adaptability to different situations and people, independence, and enjoyment in daily healthful activities. The same courses of study stress simple habits of cleanliness, prevention of infection, wholehearted participation in work and play, and other habits that underlie healthy growth. A positive, cheerful, matter-of-fact promotion of daily health behavior should serve to reinforce the attention, and, in some cases, to counteract the negative emphasis sometimes given to these matters in privileged homes and to supplement the inadequate health care given in underprivileged homes. The mental hygiene aspects of health education are important, but these have not been studied in detail.

II. FROM THE PRIMARY GRADES TO PUBERTY

1. A Relatively Healthy Period

The years from the primary grades to puberty represent a relatively healthy period. The majority of nine-year-olds have consoli-

dated the earlier gains in growth; they have also been exposed to prevalent communicable diseases and have gained immunity through having had the disease, through inoculation, or through repeated slight exposures that their bodies were able to combat successfully. "At the end of the first decade, while growth is proceeding with a maximum of serenity and not too rapidly, the transfer of a considerable responsibility to the children themselves seems most appropriate" (33, p. 158). Their accumulated experiences and the interpretation of these experiences "should be guided to produce a somewhat automatic self-control in eating, dressing, sleeping, and exercise" (33, p. 159).

2. Growth Changes

As the child approaches puberty, aspects of development that have obvious implications for health education are: first, the preadolescent growth spurt, which is concentrated within a two- or three-year period prior to puberty; second, the changes in body size and proportion, indicated by the fact that each dimension studied has its own characteristic growth pattern (30, p. 182); third, anomalies of growth that occur in some cases; fourth, the acceleration of girls over boys by one or two years in height, weight (20), and ossification of the wrist bones (8); fifth, the individual differences in age of onset of puberty and the growth changes associated with physiological maturity; and sixth, the increase in acne and associated skin lesions.

The accelerating phase, which "reaches its climax not at any one chronological age but as early as age ten or as late as age fourteen" (30, p. 189), suggests greater dietary needs during this two- or three-year period prior to puberty. Knowledge of the individual differences in growth trends is valuable in the guidance of boys and girls who wonder whether they will ever stop growing, or whether they will be runts all their lives, or whether they are normal. The individual who begins to grow rapidly at age eight may expect to reach the climax of his accelerating phase at or after puberty, while the individual who is growing slowly before age twelve is likely to have a less rapid, intense, and prolonged growth spurt. It is not the physical changes *per se* that may precipitate problems of adjustment so much as the way in which they are perceived by the child himself and reacted to by him or by persons in his environment; as, for example, the tendency of girls who tend to be fat to be unduly disturbed by the increase in subcutaneous, fatty tissue. Health education should help boys and girls to understand the growth changes of this period, and to correct or to accept realistically

and in proper perspective individual handicaps or peculiarities. The developmental differences between boys and girls indicate the need of segregation of boys and girls for physical exercise and for the discussion of these prepubertal and adolescent problems prior to their appearance.

Many of the defects noted in the earlier years persist in intermediate grades. Vision, hearing, and cardiac efficiency should be investigated and appropriate treatment and training given (33).

3. Diet and Related Health Habits

It would be difficult to prove conclusively that some of the habits usually assumed to promote health are directly related to good health in individual cases, because children differ so greatly in their constitutional assets and physiological needs, and because the effect of poor habits may not show for years or even within an individual's lifetime. This physiological lag has been amply demonstrated in animal experiments. But experimental work has also clearly shown more immediate effects of deficiencies in dietary essentials, such as the improvement in height, weight, and general vitality as a result of more adequate diet, and the recurring association, whether causal or spurious, between sugar and dental caries.

The early extensive survey of child health in the fifth grade in eighty-six cities in the United States (26, 39) showed that 22 percent of the 35,000 fifth-grade children who answered the questionnaire reported that they drank no milk; 39 percent drank some coffee and tea every day (15 percent had two or more cups); and 85 percent had no fruit for breakfast. Another more valid study of the health habits of 3,512 elementary-school children, ranging in ages from four through thirteen years (25), used the method of personal observation of individual children by parents and teachers. Problems of eating, sleeping, exercising, and keeping clean were found to persist through the intermediate grades of elementary school. The habits of drinking milk and eating vegetables had not yet been established; children still ate candy between meals; problems of insufficient sleep increased in frequency; the amount of outdoor recreation decreased at the ages of eleven, twelve, and thirteen years, especially in the case of girls; and bathing and washing the hands after going to the toilet appeared to be a less common practice in the intermediate grades than in the primary grades. The fact that only a few children showed improvement in the health habits that were studied is significant, although it would be well

to have more objective data concerning the actual seriousness of some of the practices that conventionally are regarded as bad health habits. Equally significant are the facts that the slow children consistently showed what are usually considered as poorer health habits at all ages than the bright children, and that a favorable home environment was clearly associated with good health habits.

4. Mortality Statistics

Mortality and morbidity statistics throw further light on the health problems of these years. Deaths from tuberculosis increased from 805 between the years five to nine to 1,184 between the years ten to fourteen, and to 4,364 in the later adolescent years (7). Health education obviously should attempt to check and eventually to reduce markedly this increase in deaths from tuberculosis.

Especially do mortality figures due to certain accidents pile up in these years. Burns, accidental drownings, injuries by firearms, falls and crushing, and automobile accidents cause a large number of deaths of school children. A study of accidents among pupils in the kindergarten through the twelfth grade, during a four-month period (31), showed the peak of danger to pupils to be in the sixth grade.

These facts indicate the need for instruction in preventive measures during school years. The possible effectiveness of safety education is suggested by the fact that since 1922, when safety education was made a part of the curriculum, the death rate of children decreased 11 percent while that of adults increased 18 percent (31).

5. Health-Education Curricula

Carefully constructed health-education curricula developed co-operatively by teachers and specialists (12, 27, 29, 35, 36) show no definite developmental trends. At all ages habits of cleanliness, eating the right food, sleep and rest, exercise, safety, care of eyes, ears, nose, and throat, and prevention of communicable diseases are taught in some form. First aid, community hygiene, and discussions of the effects of alcohol and tobacco are usually not introduced until after the primary grades, although in several new courses of study community health problems are considered in connection with the social studies beginning with the first grade. The specific experiences that constitute the health curriculum should, of course, vary with different communities. In certain situations diet may be most important; in others, traffic safety must be stressed. It is evident, however, that the curricula based

on health needs of different groups of children show a fairly large body of common subject matter, possibly in part attributable to copying of courses of study and to incorporating programs laid out in textbooks.

In these courses of study 'activities' are emphasized. Children are expected to acquire health habits, attitudes, and knowledge through situations that offer opportunities for healthful living. The difficulty of making generalizations as to the grade placement of health subject matter is obvious in view of the wide differences found in intelligence, health needs of the community, the children's previous knowledge, their immediate motivation for learning, methods of instruction, and other factors.

An intensive experiment by Hardy and Hoefer (13) on methods of teaching health was begun in Grade III and continued from September, 1923, to June, 1927. The experimental group followed a program that included health examinations, health instruction in the classroom, extensive contacts with child specialists, and follow-up by the school nurses of recommendations made by the pediatrician. The control group had the same health services, but no special classroom instruction. The experimental group was superior to the control group in general physical condition, nutritional rating, firmness of muscle, posture, muscular strength and vigor, and number of defects corrected. This superiority of the experimental group, however, cannot be attributed to the classroom health instruction alone. It was a resultant of the other features of the program and, to some extent, of the special characteristics of the group.

With children in the fifth and sixth grades, Franzen (10) found that, in general, such devices as health songs, modern health crusades, and lectures by doctors were not associated with high scores on health tests. Somewhat similar methods were found to have little value in changing the conduct and attitudes of elementary-school children with respect to safety (31). Demonstrations, visual education, and individual follow-up of specific conditions appear to yield the best results in improved health status.

III. ADOLESCENCE

Apart from physical abnormalities, and from tuberculosis, the health problems of adolescence are primarily psychological and social. With the increased social consciousness and social sensitivity of this period, it is appropriate that the social aspects of health be emphasized.

A more thoughtful consideration of health problems may likewise

be encouraged, since children with mental ages above twelve years or thereabout may be expected, under good instruction, to make generalizations and abstractions based upon information and experience.

The adolescent's interests in health have been systematically studied by Oberteuffer (23, 24). Members of hygiene classes in high school and college asked many questions relating to playing, eating, weight and growth, teeth, keeping well, safety and first aid, alcohol, tobacco, personal appearance, breathing, seeing and hearing, resting, thinking and feeling, social relations, venereal diseases, heredity, public welfare, and working. Most of these topics were common to Grades VII through XII, with more emphasis on the last six items in the upper grades. Of all the topics presented, mental health was rated by men college students as the most valuable.

It appears that with the coming of adolescence, children give considerably more thought to matters of health than is the case during earlier years. In a study by J. N. Washburne (37) of the wishes expressed by four hundred adolescent boys and girls, it was found that approximately 34 percent of all the children expressed wishes that could be classified under the general heading of "health and long life." Wishes in this category were outnumbered by wishes in only five other general categories ("happiness," "skill in school," "clothes," "auto," and "wealth"). As noted above, only about 10 percent of children aged five to twelve, in another investigation (16), expressed wishes belonging in the category of health.

Three kinds of accidents reach their peak in the secondary-school years; namely, drowning, injury from firearms, and automobile accidents.

IV. FURTHER RESEARCH NEEDED

Direct and concrete experimental evidence is necessary in order to answer the following questions: (1) What habits, attitudes, and knowledge are essential to healthful living at different ages and in various environments? (2) What functioning health knowledge can be acquired by children of different mental ages? (3) How can healthful living be taught effectively to children of different stages of development and environmental circumstances? (4) What is the mental hygiene of different kinds of health instruction? (5) What is the relation of morbidity while young to immunity when older? (6) What administrative set-up provides the best conditions for effective health education?

Because of the complexity of factors affecting an individual's

health, it is almost impossible to arrange a control-group experiment that will yield conclusive results. It would seem that the most rewarding type of research in this field would be the intensive study of the process by which individuals, over a period of years, acquire habits, attitudes, and knowledge that help them to avoid illness and to attain maximal health.

BIBLIOGRAPHY

- (1) ANDERSON, JOHN E. "The attendance of nursery-school children." *School and Society*, 24: August 7, 1926, 182-184.
- (2) BORGESON, GERTRUDE. *Techniques Used by the Teacher in the Nursery School Luncheon Period*. (New York: Teachers College, Columbia University, 1937)
- (3) BOTT, E. A.; BLATZ, W. E.; CHANT, N.; and BOTT, H. "Observation and training of the fundamental habits in young children." *Genetic Psychology Monographs*, 4: July, 1928, 1-162.
- (4) CAIRNS, LAURA. *A Scientific Basis for Health Instruction in Public Schools*. (Berkeley: University of California: Vol. 2, No. 5, Univ. of Calif. Publications in Education, 1929, 339-434)
- (5) COLLINS, S. S. "The incidence and causes of illness at specific ages." *Milbank Memorial Fund Quarterly*, 13. October, 1937, 320-338.
- (6) CONRAD, HERBERT S., and JONES, MARY COVER. "A two-year record of attendance and colds in a nursery school." *Child Development*, 3. March, 1932, 43-52.
- (7) DUNN, HALBERT L. *Mortality Statistics, 1934*. Thirty-Fifth Annual Report, U. S. Dept. of Commerce, Bureau of the Census. (Washington, D. C.: U. S. Government Printing Office, 1936, Table 7, 160-213)
- (8) FLORY, CHARLES D. "Sex differences in skeletal development." *Child Development*, 6: September, 1935, 205-212.
- (9) FOSTER, JOSEPHINE C. "School records of illness at various ages." *Journal of Educational Research*, 20: November, 1929, 283-286.
- (10) FRANZEN, RAYMOND. *An Evaluation of School Health Procedures*. (New York: American Child Health Association, 1933. xii + 127 pp.)
- (11) GESELL, ARNOLD, and ILG, FRANCES L. *Feeding Behavior of Infants*. (Philadelphia: J. B. Lippincott, 1937)
- (12) GROUT, RUTH E. *Handbook of Health Education*. (Garden City: Doubleday, Doran and Company, Inc., 1936. xxii + 298 pp.)
- (13) HARDY, MARTHA CRUMPTON, and HOFFER, CAROLYN H. *Healthy Growth: A Study of the Influence of Health Education on Growth and Development of School Children*. (Chicago: The University of Chicago Press, 1936)
- (14) *Health and Growth Series, Teachers' Manual*. (New York: The Macmillan Company, 1935, 8-13)
- (15) HILLEBOE, M. E. "Preventive aspects of crippling diseases." *American Journal of Public Health*, 28: April, 1938, 451-457.
- (16) JERSILD, ARTHUR; MARKEY, FRANCES V.; and JERSILD, CATHERINE L. *Children's Fears, Dreams, Wishes, Likes, Dislikes, Pleasant and Unpleasant Memories*. (New York: Teachers College, Columbia University, 1933. xi + 172 pp.)

- (17) JONES, HAROLD E. "The California adolescent growth study." *Journal of Educational Research*, 31: April, 1938, 561-567.
- (18) League of Nations on the Relation of Nutrition to Health, Agriculture, and Economic Policy. *Nutrition*. (Geneva: Final Report of Mixed Committee, Official No. A 13, 1937, II a: 72-78)
- (19) MELPOOLDER, JOHN. "Home accident prevention." *Journal of Home Economics*, 30. April, 1938, 231-234.
- (20) MEREDITH, HOWARD V., and STODDARD, GEORGE D. "Physical growth from birth to maturity." *Review of Educational Research*, 6. February, 1936, 54-84.
- (21) MOORE, FREDERIKA, and HAMBLEM, ANGELINA. "Sixth-grade health awareness in Massachusetts." *Journal of Educational Research*, 30: May, 1937, 684-693
- (22) NORTON, JOHN K., and NORTON, MARGARET ALLTUCKER. *Foundations of Curriculum Building*. (New York. Teachers College, Columbia University, 1930, Chapter V)
- (23) OBERTEUFFER, DELBERT. *Personal Hygiene for College Students*. (New York: Teachers College, Columbia University, 1930)
- (24) OBERTEUFFER, DELBERT. *Program for Junior and Senior High Schools*. (Physical and Health Education Series, State of Ohio, Department of Education, 3: 1932)
- (25) O'NEILL, FLORENCE C., and McCORMICK, MARY G. *Everyday Behavior of Elementary School Children*. (Albany: University of the State of New York Bulletin, No. 1057. University of the State of New York Press, 1934. 147 pp.) See also the use of the results of this investigation in O'NEILL, FLORENCE C. *A Guide to the Teaching of Health in the Elementary School*. (University of the State of New York Bulletin, No. 1090, 1936-1937)
- (26) PALMER, GEORGE T., et al. *A Health Survey of 86 Cities*. (New York: American Child Health Association, 1925. xxxiv + 614 pp.)
- (27) PINCKNEY, JEANIE M., et al. *A Health Instruction Guide for Elementary-School Teachers*. (Bureau of Nutrition and Health Education, Extension Division, University of Texas, 1932)
- (28) REYNOLDS, MARTHA MAY, and MALLAY, HELENA. "The sleep of young children." *The Pedag. Seminary and Jour. of Genetic Psychol.*, 43: December, 1933, 322-351.
- (29) ROSE, MARY SWARTZ. "A five-year study of nutrition teaching in the fifth and sixth grades of the elementary school." *Teachers College Record*, 31: May, 1930, 733-754.
- (30) SHUTTLEWORTH, FRANK K. *Sexual Maturation and the Physical Growth of Girls Age Six to Nineteen*. (Monographs of the Society for Research in Child Development, Vol. II, No. 5, Serial No. 12. National Research Council: Washington, D. C., 1937, 253 pp.)
- (31) STACK, HERBERT J. "What we can contribute to safety." *The Journal of Health and Physical Education*, 8: January, 1937, 6-7.
- (32) STOLTENBERG, L. "Child Development in Norway." *The American-Scandinavian Review*, 24: June, 1936, 107-115.
- (33) STOLZ, HERBERT R. "Growth needs of children in the intermediate grades." *Educational Method*, 17: January, 1938, 157-162.

- (34) STRANG, RUTH; LANE, HOWARD A.; and LINCOLN, EDWARD A. "Health and physical education." *Review of Educational Research*, 7: December, 1937, 482-490.
- (35) *Tentative Course of Study for Virginia Elementary Schools, Grade I-VII.* (The Board: Richmond, Virginia. 1934)
- (36) TURNER, C. E. *Principles of Health Education.* (Boston: D. C. Heath and Company, 1932)
- (37) WASHBURN, J. N. "The impulsions of adolescents as revealed by their written wishes." *Jour. of Juvenile Res.*, 16: 1932, 193-212.
- (38) WOOD, THOMAS D., and LERRIGE, MARION O. *Health Behavior* (Bloomington, Illinois. Public School Publishing Company, 1927)
- (39) WOOD, THOMAS D. (Chairman) Report of the Joint Committee on Health Problems in Education (third edition). (Bloomington, Illinois Public School Publishing Company, 1938)
- (40) White House Conference on Child Health and Protection. *Nutrition, Growth and Development of the Child, Part III.* (New York: D. Appleton-Century Company, 1932. xx + 532 pp.)

CHAPTER IV

EARLY TRAINING IN ROUTINE PHYSICAL HABITS

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I. EATING

The primitive drive to obtain nourishment is perhaps the strongest and most dependable of all drives in living beings, and for this reason, if for no other, the establishment of wholesome feeding activities should be the most 'natural' and the easiest feature of the training of children. Actually, however, feeding activities are fraught, in modern life, with many 'problems,' and have been overlaid by rules, formulas, and cults more numerous and complicated than the taboos of primitive people. In no other area of the child's education would it be more helpful if facts were available for outlining a scheme by which the child's habits, and even his diet, could be based to a maximal degree upon nature and to a minimal degree upon arbitrary rules and special training.

1. Early Attitudes, Skills, and Habits

In most newborn infants, the instinctive response of sucking is so strong that nutritional needs are easily met by supplying the breast or the bottle. The time between feedings must, perforce, be determined mainly by the child's needs, but children with healthy appetites can soon acquire hunger rhythms suited, to a large degree, to the convenience of the parent or nurse (4). In some infants the sucking response is feeble, and some display marked individual patterns of physiological rhythm (45), so that even at birth there are individual differences in amenability to scheduling that cannot be ignored, and all infants cannot learn the same rhythm (4).

In introducing recommended foods, other than milk or formula, certain facts must be taken into account. The infant may have a natural dislike for strong or different sensory experiences (4), which suggests a policy of introducing new foods gradually. The appearance of biting at about four months, chewing at about seven (45), and the improvement of hand-to-mouth movements at seven to nine months offer some clues to procedure. According to Gesell and Ilg (22), some infants are neuro-muscularly ready for solids as early as twelve weeks of age, but in general it is advisable to defer solids until the age of sixteen weeks. Given the opportunity, a child may become quite competent in handling a cup by the end of the first year. Efforts to accelerate the child's own interests in manipulation, or to interfere with them at any time, may retard the learning process, as may undue objection to passing caprices and mannerisms. If the job of satisfying the appetite is too hard, by virtue of the child's limited powers, a negative set toward the eating situation may arise (4). Enjoyment of the process of feeding is an important aid to the establishment of eating habits (4, 45); the more a child can work out his own problems in the activities involved in eating, the more satisfactory his progress is likely to be.

The maturation of patterns involved in later refinements of eating has not been studied in the same detail as the earlier development of sucking, chewing, biting, hand-to-mouth activities, and the manipulation of implements. During the second year, and thereafter, learning through practice under favorable social conditions plays an increasingly important rôle. Among the tentative norms that have been suggested are the following (45): chewing and swallowing of fairly bulky solids by the end of the second year; considerable 'natural' finger feeding is likely to appear, even when gradual perfection of spoon techniques is occurring during the second and third years; use of blunt fork may be looked for at about two to three years, of the blunt knife at three to five, and of the knife for cutting at five to six. Eating efficiency shows a high correlation with age during preschool years (5). Some data are available regarding norms during preschool years (6, 21, 30). Expectations with regard to niceties and skills in eating no doubt vary considerably in different homes and nursery schools. In acquiring skill through practice, the child must be free to make mistakes, which involve some spilling, dropping of utensils, and general messing; acquisition of the basic skills, and the development of wholesome attitudes toward eating should take precedence over niceties of table manners. Intolerance of unavoidable imperfections in early eating skills undoubtedly has contributed to feeding 'problems' in the case of many children.

2. Selection of the Proper Foods

An obviously important matter is the selection of the proper foods. To what extent can the child's own 'nature' be trusted in this connection? The findings obtained by Davis (10, 11, 12, 13, 14) in studies of the formulas chosen by infants during the weaning period, and of the diets selected by infants after the weaning period, are decidedly challenging. The evidence in these and other studies (34, 36) indicates that children can be trusted to a large degree to choose a balanced diet when allowed to select their own meals from a variety of simply prepared articles of diet set before them, granted that they have a suitable variety of items from which to choose, and granted that their feeding behavior has not already become perverted by extraneous problems, such as undue resistance to all adult attentions. To supply a proper variety may be quite a practical problem in some homes (9), but articles supplying a completely balanced diet need not be presented at every meal if sufficient variety is supplied over a period of time (34). The theory that the child himself should have little to say regarding what he is to eat (45) has been modified in later writings (4). Granted reasonable supervision, it appears that more success can be expected from a policy of not urging, of leaving the child alone, of gradually introducing new foods that the child at first can take or let alone, of showing unconcern toward refusals of food and being tolerant (within limits) of caprices in taste, than can be expected from a policy of pressing the child to eat a certain food or a certain amount of food each time he is fed (1, 2, 36). Granted that nutritionally wholesome articles of diet are provided to supply a balanced diet over a period of time, it appears that the average child will show a good deal more sense in eating 'what is good for him' than he sometimes is credited with, even though his choices of food at a given time may seem bizarre and his intake of various articles of food on occasion may appear to be either decidedly inadequate in quantity or amazingly in excess of 'normal.'

3. Control of the Eating of the Individual Child

It obviously would be impossible to lay down definite rules as to how to proceed with every child, not only because of individual differences among children in appetites, needs, and speed of eating (42), but also, to an important degree, because of differences in family settings and attitudes, which cannot be considered here.

An incidental problem in connection with feeding is that of finger-sucking. In many children, finger-sucking occurs as a habit that dis-

appears as the child grows older. The hand- or finger-to-mouth response is strong during early infancy. It usually is intensified by the teething process. If the finger-sucking habit persists and continues strong beyond the age of about six years, it may produce dental malformation in some children (Lewis 29). The importance of the rôle of sucking and nursing in the child's early emotional experience has been described by Frank (18). Levy's observations (28) suggest that an infant's drive to exercise the activity of sucking may be in excess of the sucking requirements involved in obtaining sufficient food. If his appetite for food has been sated without fully satisfying his need for sucking, he will proceed to suck anything that is convenient, including his fingers. Such extraneous sucking activities have sometimes been observed to disappear if, for example, a nipple with a small aperture is substituted for one with a larger aperture, thereby necessitating a longer time with the bottle, or if one of the daily bottle feedings that has been discontinued is restored for a time. When such expedients are not practicable, a pacifier may help the child to become *ausgesaucht*, thereby possibly forestalling the habit of sucking the thumb.

II. SLEEPING

1. In Infancy

Many studies deal with the characteristics and the duration of the sleep of young children. In the newborn, the activity of the infant is greater before nursing than afterward (25); poor nutrition may cause restlessness (33); infants under one year appear to be more restless during sleep than do older children (31); the 'natural' sleep periods of young infants are rather short in duration, though early in the child's life sleep occupies about 80 percent of the child's time; toward the end of the first year the sleep periods lengthen, but the total sleep decreases to only about one half the day (7). The duration of sleep periods — as distinct from total amount of sleep — is related to needs for nourishment and elimination. There are individual differences between infants both in sleep rhythms and in amount of sleep required (41).

2. Sleep Norms and Requirements

Many writings on the subject of child care have recommended 'norms' for the amount of sleep needed at various age levels. It is not unlikely that these recommendations often have been in excess of the amount of time many children spend in sleep and of the amount

they actually need (17). By reason of individual differences in sleep habits and requirements, definitive recommendations concerning the sleep requirements of individual children cannot be made on the basis of available data. The data do indicate, however, that in infancy adequate nutrition, a fair degree of quiet just before and during sleep, and opportunity for spontaneous exercise of a sort that will produce moderate fatigue will probably result in an adequate amount of sleep.

Extensive studies of the amount of time spent in sleep at various age levels have been conducted at the University of Minnesota by Foster, Goodenough, and Anderson (17, 24).¹ Approximately a thousand records of children's sleep were obtained for each day of a week during each of the four seasons of the year. The following summary, showing average amount of time spent in sleep (in hours: minutes), is based upon the data for all seasons combined, up to the age of seven years.

TABLE I.—TOTAL SLEEP BY AGE: AVERAGE PER DAY

(Data in the first column are drawn from the Minnesota studies by Foster, Goodenough, and Anderson (17, 24); those in the second column from the reports secured from children by Terman and Hocking (40) of the hours spent in bed and in sleep.)

Age	Hours	Minutes	Age	Hours	Minutes
1-6 mos.	15	3	8-9 yrs.	10	42
6-12 mos.	14	9	9-10 yrs.	10	13
12-18 mos.	13	23	10-11 yrs.	9	56
1½-2 yrs.	13	6	11-12 yrs.	10	00
2-3 yrs.	12	42	12-13 yrs.	9	36
3-4 yrs.	12	7	13-14 yrs.	9	31
4-5 yrs.	11	43	14-15 yrs.	9	06
5-6 yrs.	11	19	15-16 yrs.	8	54
6-7 yrs.	11	4	16-17 yrs.	8	30
7-8 yrs.	10	58	17-18 yrs.	8	46

Table I shows a steady decline with age in amount of sleep from six months to eleven years, and an irregular decline thereafter. The Minnesota studies, on which the averages in the first column are based, provide many significant additional outcomes. When separate averages were computed for each season of the year, the values at all age levels were consistently higher in the winter than in the summer—the

¹ For a more extended treatment of practical procedures in connection with children's sleep, as well as of other phases of child rearing here under discussion, see Faegre and Anderson (16).

differences range from eight to over fifty minutes (15, 17). Large individual variations appeared at each age level; the differences between the children at the 90th and the 10th percentiles were more than three hours below the age of one year, more than two hours up to the age of four years, and more than an hour from four to eight years. The results with regard to the relation between amount of daytime and nighttime sleep are also instructive; the drop in amount of sleep with age is based primarily upon a decline in amount of daytime as distinguished from nighttime sleep. From the age of two to eight years the length of night sleep remains practically stationary at eleven hours; but there is a steady decline in the average amount of daytime sleep (24, Fig. 1, p. 6).

In observations of children in a twenty-four-hour nursery school, the respective average number of hours during the summer spent in sleep by two-, three-, and four-year-old children was 12½ hours, 11 hours and 23 minutes, and 10 hours and 57 minutes, based on a total of 34 subjects (35). These averages parallel, though they are a bit lower than, the averages reported for the summer season in the Minnesota study. One hour was the mean length of time required to go to sleep. Daily fluctuations in amount of sleep were wide, but weekly and monthly records showed a high degree of constancy — if a child obtained a good deal less than his usual amount of sleep one night, he would 'make it up,' not all at once, but over the ensuing days.¹

3. Daytime Naps

In the case of many children, daytime naps have been found to drop out on an 'all-or-none' basis (35). The nap either continues or drops out entirely, rather than tapering off by degrees. After the age of two years, long daytime naps may interfere with night sleep (5). Findings have varied as to the effect of outdoor play on promptness in falling asleep at naptime (38, 39). In one study it was found that short naps went with long sleep-going time, long naps with short sleep-going time; that is, "The child learns to stay in bed a certain amount of time" (38). Comparisons of sleep and personality records indicated that "the spontaneously active, interested, and socially well-adjusted child does not

¹ It may be noted that the findings with regard to sleep here correspond to those obtained in studies of feeding behavior: a child's sleep during a given day may fluctuate, just as his appetite and selection of foods may be erratic from one meal or one day to the next, but over a longer period of time his needs are likely to assert themselves and to achieve a balance that may not be apparent at all during shorter periods of time.

spend as much time in sleep nor does he fall asleep as quickly after going to bed" (at naptime) as the child who shows little interest in his playmates and little spontaneity and activity on the playground. The actual sleep habits of children during naptime do not conform to fixed standards (43). Research does not support the practice of requiring that all children have a midday nap after the age of two years, although a period for rest and quiet is regarded as wholesome (4, 45). Granted that there are no associated disturbing factors (such as poor health or over-excitement) and granted an opportunity to escape from noise and light, a child's own spontaneous needs are the best guide to his sleep requirements, although, it should be added, in most homes a certain amount of regimentation as to bedtime is advisable for the sake of the child and the convenience of his elders.

One thing that many older children and most adults sorely need is the ability to relax completely and to rest for a few minutes at a time during the course of the day's work. Studies of fatigue have abundantly shown that several brief rest periods may be decidedly more refreshing than the equivalent time spent in one long rest period. A happy faculty for relaxing and resting at intervals during the day would mean much to many adults, but it does not appear that this ability is fostered by the sort of training in rest and sleep usually imposed upon young children, whose habits, in this regard, are governed more by conventions and the clock than by their own varying needs from hour to hour and from day to day. Apart from a few surveys, the sleep requirements of children of elementary- and high-school age have received but little systematic study. Additional research is especially needed in connection with the management of work and rest periods during the school day.

III. ELIMINATION

Included in the factual literature regarding control of elimination are case studies by Blatz (4), a study of bladder control by Scoe (37), and records of bladder and bowel functions (22). It has been pointed out in the literature that control of elimination involves restriction and inhibition, and therefore differs in notable respects from the controls involved in eating (4, 22). At just what age a child, if left to himself, would become conscious of sensations from the organs of elimination and would acquire voluntary control over sphincter muscles, which he cannot even see and the action of which is involuntary at the beginning of life, we cannot tell from available findings. Early efforts to train the child must necessarily capitalize the child's own rhythms. By reason

of the fact that movements of the bowels are usually more predictable than urination, bowel control can commonly be established to some degree during the first half year (although the 'control' is exercised more by the alert mother than by the child himself). Control of the bladder usually cannot be effectively promoted until some months later. In either case, effective control by the child must wait until he has reached sufficient mental maturity to let his needs be known, either by language or by some other sign.

Reasoning from the physiology of the process, Blatz (4) recommends that attempts to regulate urination be deferred until the latter half of the first year. The bladder needs to grow before it can hold a substantial volume of waste. When intervals between spontaneous urination have been established roughly, the child can be taken to the chamber at 'strategic' intervals, as after meals and before sleep. It is important to avoid scolding and punishment for failure to retain or to notify, and to avoid anything that associates unpleasantness — other than the natural unpleasantness of being wet — with the process. With proper care, daytime control of the bladder can be established by about the age of one and a half to two years, and night-time control by the third birthday or later (4, 45).

That training in control of elimination may be fraught with all manner of emotional complication is recognized by all students of child psychology. It has been emphasized also by Freudian writers (19, 20). The frequency of the 'problems' of enuresis and bed-wetting during later childhood years also testifies to the importance of proper training. (Often it is found that these problems are associated with deeper mal-adjustments. It is possible, also, that there may be a hereditary factor in some cases.) The eliminative habits and difficulties of 'normal' children of elementary-school age have not been studied systematically. Certain it is, however, that many youngsters who do not suffer from enuresis do undergo much embarrassment, anxiety, and shame in connection with the processes of elimination. Moreover, it also is patent that for most children who have been brought up according to conventional standards, the vocabulary of elimination is an emotionally charged one, and many words associated with it are taboo. It undoubtedly would be a wholesome thing if all teachers could overcome their own inhibitions with regard to these terms, so that, as soon as the child is old enough to use the words in his vocabulary, terms referring to the process and organs of elimination could be used by children and adults with complete absence of embarrassment or inhibition.

IV. DRESSING

The process of dressing, in common with other forms of self-help, often is connected with problems of over-assistance, unduly prolonged dependence on adults, resistance, tantrums, and other disturbing conditions. Frequently when one finds a child who continues to have things done for him that he could well do himself, this condition is only one of many parental practices that have the effect of prolonging a child's helplessness and dependence.

A study by Key and her associates affords some norms of performance during successive years from two to five. Skill in buttoning, as noted in Chapter II, was studied by Hilgard (23). For thirteen weeks, two-year-old children received exercise in buttoning together strips of cloth. A control group was tested in buttoning at the beginning and end of this period. It was found that with one week of practice, the children of the control group were practically as competent as were the children who had had buttoning exercises during the preceding thirteen weeks. Wagoner and Armstrong (44) made systematic observations in connection with certain activities involved in dressing. They found that children at about the age of two years showed little tendency, on their own accord, to attempt to put on and to button a sleeveless jacket; beyond the age of two and a half, however, children showed increasing interest in this performance. (In time, by reason of zippers, the problem of buttoning may become obsolete!)

Recommendations regarding the promotion of skill in dressing, and what may be expected at successive age or maturity levels, are based mainly on the informal observations of parents and nursery-school teachers. Tentative norms and sequences have been described by Alschuler (3).

A child's participation in dressing begins long before he is able to take an active hand in the details. During the latter part of the first year, and part of the second, his participation takes mainly the form of yielding his trunk and his limbs to the process of being dressed (or it may take the opposite form of resisting the process). At two to three years, this form of participation is coupled with more specific activities, such as finding armholes and putting the arms through, taking off stockings and shoes that are unlaced. Near the third birthday, the child can begin to wash and dry his hands, although he requires both direction and help. In the transition to more active participation, some practical considerations may be noted: some details (such as taking off clothes

that already have been unfastened) can be mastered earlier than others (such as putting on clothes, or unfastening buckles, knots, and buttons); the child's attention span is short, so that in order to insure successful coöperation it is necessary at the start to make sure that the task requires not more than a few minutes, and allowance should also be made for the fact that the child's movements are clumsy and slow; small, hidden, and intricate fastenings or articles of dress should be avoided during the early stages. The proper choice of garments will, of course, make a good deal of difference in the age at which a child can manage for himself.

During the third year, most children can participate more actively, and can manage many details of dressing and of cleanliness, but they still need supervision and help; with proper help, they can unbutton side and front buttons, put on roomy and handy pants, leggings, coats, and shoes, untie laces that are not too tightly knotted, wash and dry hands, brush teeth, and comb hair. Further progress in self-help in these activities can be expected during the fourth year. During this time, the child is advancing toward increasing ability to do things on his own responsibility, and without detailed directions, so that during the fifth year he can, on his own account, put on and take off his clothes without supervision, wash and dry his face, comb his hair, and brush his teeth.

As progress is made in research dealing with the development of motor abilities, in general, and of the performances involved in dressing and grooming in particular, many of the above recommendations would no doubt have to be supplemented or revised. Further systematic study is needed, not only concerning 'norms' and individual differences, but also concerning individual activities, and the wisdom of various customs and conventions that prevail in the matter of what children should wear.

BIBLIOGRAPHY

- (1) ALDRICH, C. A. *Cultivating the Child's Appetite*. (New York: The Macmillan Company, 1927. 137 pp.)
- (2) ALDRICH, C. A. "The prevention of poor appetite in children." *National Committee for Mental Hygiene*, 10: No. 4, 1936.
- (3) ALSCHULER, R. *Two to Six*. (New York: William Morrow, 1937. 189 pp.)
- (4) BLATZ, W. C. "The physiological appetites." (In Carl Murchison — Editor). *Handbook of Child Psychology*. (Worcester: Clark University Press, revised ed., 1933, 723-772)
- (5) BLATZ, W. C.; BOTT, E. A.; CHANT, N.; and BOTT, H. "Observation and training of the fundamental habits in young children." *Genet. Psychol. Monog.*, 4: No. 1, 1928, 1-161.

- (6) BLATZ, W. E.; MILLICHAMP, D.; and FLETCHER, M. *Nursery Education: Theory and Practice*. (New York: William Morrow, 1935. 365 pp.)
- (7) BÜHLER, C. *First Year of Life*. (New York: John Day Company, 1930. 277 pp.)
- (8) BURNHAM, W. H. "The hygiene of sleep." *Ped. Sem. and Jour. Genet. Psychol.*, 22: 1920, 1-35.
- (9) DALE, J. "Nursery-school feeding—a symposium." *Jour. Home Economics*, 28: 1936, 371-379.
- (10) DAVIS, C. M. "Choice of formulas made by three infants throughout the nursing period." *Amer. Jour. of Diseases of Children*, 50: 1935, 385-394.
- (11) DAVIS, C. M. "The common cold and allied upper respiratory infections." *Jour. of Pediatrics*, 5: 1934, 573.
- (12) DAVIS, C. M. "A practical application of some lessons of the self-selection of diet study to the feeding of children in hospitals." *Amer. Jour. of Diseases of Children*, 46: 1933, 743-750.
- (13) DAVIS, C. M. "Self-selection of diet by newly weaned infants." *Amer. Jour. of Diseases of Children*, 36: 1938, 651-679.
- (14) DAVIS, C. M. "Self-selection of diets: an experiment with infants." *The Trained Nurse and Hospital Review*, 86: 5, 1931.
- (15) ERWIN, D. "An analytical study of children's sleep" *Ped. Sem. and Jour. Genet. Psychol.*, 45: 1934, 199-226.
- (16) FAEGRE, M. L., and ANDERSON, J. E. *Child Care and Training*. (Minneapolis: University of Minnesota Press, 4th ed., 1937. 327 pp.)
- (17) FOSTER, J. C.; GOODENOUGH, F. L.; and ANDERSON, J. E. "The sleep of young children." *Ped. Sem. and Jour. Genet. Psychol.*, 35: 1928, 201-218.
- (18) FRANK, L. *The Fundamental Needs of the Child*. (Conference of the National Association for Nursery Education: Nashville, October 22, 1937)
- (19) FREUD, A. *Introduction to the Technic of Child Analysis*. (Washington, D. C.: Nervous and Mental Diseases Monograph, No. 48, 1928. 59 pp.)
- (20) FREUD, A. *Three Contributions to the Theory of Sex*. (Washington, D. C.: The Psychoanalytic Review, Nervous and Mental Diseases Monograph No. 7, 1925. 118 pp.)
- (21) GESELL, A. *Mental Growth of the Preschool Child*. (New York: The Macmillan Company, 1925. 447 pp.)
- (22) GESELL, A., and ILG, F. L. *Feeding Behavior of Infants*. (Philadelphia: J. B. Lippincott, 1937. 199 pp.)
- (23) HILGARD, J. R. "Learning and maturation in preschool children." *Jour. Genet. Psychol.*, 41: 1932, 36-56.
- (24) Institute of Child Welfare. *The Sleep of Young Children*. (Minneapolis: University of Minnesota, 1930, Circular No. 4, 11 pp.)
- (25) IRWIN, O. C. "The amount and nature of activities of newborn infants under constant external stimulating conditions during the first 10 days of life." *Genet. Psychol. Monog.*, 8: No. 1, 1930, 1-92.
- (26) ISAACS, S. *The Nursery Years*. (New York: The Vanguard Press, 1936. 138 pp.)
- (27) KEY, C. B.; WHITE, M. R.; HONZIK, M. P.; HEINEY, A. B.; and ERWIN, D. "The process of learning to dress among preschool children." *Genet. Psychol. Monog.*, 18: 1936, 67-163.

(28) LEVY, D. M. "Thumb or finger sucking from the psychiatric angle." *Child Development*, 8: 1937, 99-101.

(29) LEWIS, S. J. "The effect of thumb and finger sucking on the primary teeth and dental arches." *Child Development*, 8: 1937, 93-98.

(30) *Manual of Nursery School Practice*. (Iowa City: Iowa Child Welfare Research Station, University of Iowa, March, 1934, 33-43)

(31) MARQUIS, D. P. "Study of activity and postures in infants' sleep." *Ped. Sem.*, 42: 1933, 51-69.

(32) MEAD, M. "The primitive child." (In Carl Murchison — Editor). *Handbook of Child Psychology*. (Worcester: Clark University Press, 1931 and 1933, 909-926)

(33) OSBORNE, C. A. "The sleep of infancy as related to physical and mental growth" *Ped. Sem.*, 19: 1912, 1-46.

(34) PREVEY, E. "Nursery school feeding — a symposium." *Jour. Home Economics*, January, 1936, 371-379.

(35) REYNOLDS, M. M., and MALLAY, H. "Sleep of young children." *Ped. Sem.*, 43: 1933, 322-351.

(36) ROBERTS, L. J. *Nutrition Work with Children*. (Chicago: University of Chicago Press, 2d ed., 1935. 555 pp.)

(37) SCOE, H. F. *Bladder Control in Infancy and Early Childhood*. (Iowa City: University Press, University of Iowa Studies in Child Welfare, 5: No. 4, 1933. 83 pp.)

(38) SHERMAN, M. "Afternoon sleep of young children: some influencing factors." *Ped. Sem.*, 38: 1930, 114-126.

(39) STAPLES, R. "Some factors influencing the afternoon sleep of young children." *Ped. Sem.*, 41: 1932, 222-228.

(40) TERMAN, L. M., and HOCKING, A. "The sleep of school children." *Jour. Educ. Psychol.*, 4: 1913, 138-147; 199-208; 269-282.

(41) THOMPSON, H. "Sleep requirements during infancy." *Psychol. Monog.*, 47: No. 2, 1936.

(42) THURSTON, F. M. "Preliminary study of the factors affecting the time taken by nursery-school children to eat their food." *Ped. Sem.*, 36: 1929, 303-318.

(43) WAGNER, M. A. "Day and night sleep in a group of young orphanage children." *Ped. Sem.*, 42: 1933, 442-459.

(44) WAGONER, L. C., and ARMSTRONG, E. M. "The motor control of children as involved in the dressing process" *Jour. Genet. Psychol.*, 35: 1928, 84-97.

(45) WOOLLEY, H. T. "Eating, sleeping, and elimination." (In Carl Murchison — Editor). *Handbook of Child Psychology*. (Worcester: Clark University Press, 1931, 28-70)

CHAPTER V

THE PRACTICAL ARTS¹

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When should instruction in the practical arts be introduced? Do developmental data indicate any optimal sequence of units? In this chapter, we shall consider these questions, first, in relation to the industrial arts and, second, in relation to home economics.

I. INDUSTRIAL ARTS

1. Industrial Arts, Not Trade Education

The distinction between industrial arts and trade education is not always carefully made. Considerable confusion results from this failure (30). This report deals only with the teaching of industrial arts.

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2. Complexity of the Problems of Age or Grade Placement of Initial Instruction in Industrial Arts

Even cursory examination of the problem of age or grade placement of industrial arts indicates that it is by no means a simple one. No final solution to the problem can be secured until greater agreement is reached as to what constitutes courses in industrial arts. Large numbers of industrial and vocational courses are taught in the public schools, but with almost no standardization, in either objectives or content.

Within the past few years increasing attention has been paid to the development of adequate objectives (34). A major aim, mentioned frequently in the literature, is to prepare the individual to understand and to participate effectively in an industrial civilization (25, 36). Smith (30) insists that the objectives of industrial arts should be different at different levels of the school system. In the junior high school six industrial subjects should be made compulsory for every boy. But as to the grade placement of these subjects, he adds (30, p. 3):

I can't find anything in the literature, or at least anything objective, as to what the order of these subjects should be. I don't think we know anything about the order or sequence in which these subjects may best be given. The main point is that each boy should experience all of them.

Present practice in grade placement seems to be as chaotic as the objectives. Thus Newkirk and Stoddard (24) found in 1928 that in seventy-five schools, widely distributed throughout the United States, home mechanics was taught all the way from the fifth grade to the twelfth, being offered most frequently in Grades VII to IX.

As a result of the lack of agreement on the objectives of industrial arts courses, and the consequent ignorance of just what abilities are required to pursue such courses successfully, no decision as to age or grade placement can be made on purely developmental grounds.

3. Factors Determining the Best Time and Sequence for Instruction in Industrial Arts

Proper perspective and a realistic approach to school problems require that both developmental and non-developmental factors be taken into account in determining both the best age or grade for introducing pupils to industrial-arts experience and the optimal sequence of units. Developmental factors include (1) the chronological age of the child,

(2) mechanical ability, including motor skills and ability to learn to use tools, (3) intelligence, (4) command of the vocabulary or concepts involved in the industrial arts courses, (5) attitude toward the courses and other personality factors, such as studiousness or seriousness of purpose, (6) interests, and (7) need for industrial-arts instruction because of home or community activities in which the child may engage at one age or another. We have been unable to find any large amount of significant information on any of these factors,—in fact, on some of them we have been unable to find any data at all of value, even by extensive correspondence with the leaders in this field in public-school systems and in the colleges, universities, and higher technical schools.

Some non-developmental factors are (1) the cost of industrial arts equipment and instruction, (2) the relative value of industrial arts and the other subject or subjects that might otherwise find a place in the curriculum, (3) the influence of variations in organization and methods of instruction, (4) the nature and size of the school and the community, and (5) the objectives of instruction in the industrial arts mentioned in the preceding pages.

An adequate program in the industrial arts is expensive. Presumably the objectives will vary somewhat from one grade to another. A program that would be regarded as adequate in the first year of the junior high school probably would not be thus regarded if offered in the last year of the senior high school, nor would it have exactly the same total cost, the same per capita cost, or the same unit cost. Thus, if data on maturity should indicate that boys seventeen years of age can do better work in industrial arts than boys fourteen years of age, but if suitable instruction at seventeen costs much more than that at fourteen, the problem of age or grade placement is not so simple as weighting all these factors in some theoretical statistical fashion and combining them into a composite total; the cost at age seventeen might be prohibitive.

Curriculum construction, to be most effective, must weigh the relative values of the materials of instruction from the various subject-matter fields. The time available in schools is not unlimited. Accordingly, the curriculum patterns cannot be chosen on the basis of maturity alone. The ways in which instruction is organized and the methods of teaching probably influence achievement in industrial arts, although we have no specific research data to support this view. If instruction is individualized, it may not be necessary to find one best time for any particular unit. By varying the method, the unit may be mastered

effectively at different ages (13). The size and the type of school and community are important also, because cost is related to size. The kind of industrial courses and their age or grade placement may depend upon the type of community. It might be desirable to offer a program that would prepare children to enter local industries at a certain minimum age, or it might be best to give pupils experiences not duplicated in the out-of-school activities, or again the courses might be designed to give the child a chance to learn what occupation he might like to enter (5).

4. Chronological Age, Height, and Weight as Factors Determining the Best Time for Initial Instruction in Industrial Arts

Little information is available on the best chronological age at which to begin the study of industrial arts. The correlational studies we have found yield little information of value. Klinge (17) found slight correspondence between chronological age and achievement in second-year pattern-making, although the younger pupils did make slightly higher scores. Pritchard (28), in the case of 79 subnormal boys, chronological ages 12 to 15 years, found a correlation of .40 between chronological age and scores on a woodworking project. In the case of 300 California high-school boys¹ the correlation between C.A. and semester marks in ninth- and tenth-grade industrial-arts courses ranged from .18 to .38.

If we would know the best chronological age at which to introduce a given course in industrial arts, we should know precisely how well a reasonably large group of typical thirteen-year-olds master that course in a given time when using a given practicable method; how well a similar group of fourteen-year-olds, fifteen-year-olds, and so on, master it. From our correspondence with leaders in the field of industrial arts and from a careful search of the literature, we believe that such crucial studies have not been made. Reliable conclusions cannot be drawn from the three studies just referred to, because the age range was limited to that of a single high-school year or to a brief time in early adolescence, and the magnitude of the correlations does not warrant our basing predictions upon them. Of course, everyone believes that some chronological age is necessary, but apparently no one knows just how much of it, — another illustration of the fact that our research data sometimes do not carry us any further than does our common sense.

¹ A study made by graduate students in one of the author's classes at the University of Southern California during the 1935 summer session.

Pritchard (28) also found correlations of less than .20 between scores on a woodworking project and height and weight of seventy-nine subnormal boys, ages 12 to 15. Apparently these boys were strong enough and big enough to profit by the instruction in woodworking, but we do not know exactly how strong or how big a pupil should be before he is allowed to begin any of the industrial-arts courses.

Whatever our beliefs may be about the importance of age, height, and weight as prerequisites to initiating instruction in industrial arts, we have found no information on them of practical value to educators for curriculum construction in industrial arts.

5. Mechanical and Motor Abilities as Determiners of Placement

In answering the question, "When should instruction in industrial arts be initiated?" one assumption that might be made is that a pupil's success in industrial arts depends upon the degree to which he possesses some particular aptitude necessary for the subject. Such an aptitude, it has been suggested, is mechanical ability. The most widely used tests purporting to measure it are the Stenquist Assembling Tests of General Mechanical Ability, the Stenquist Mechanical Aptitude Tests, the MacQuarrie Test for Mechanical Ability, the Minnesota Mechanical Ability Tests (including Spatial Relations Test, Assembly Test, Paper Form Boards, Interest Analysis), and Hubbard's Questionnaire of Mechanical Interests.

Just what do these tests measure? Stenquist (31, 32) reports coefficients of correlation as high as .84 and .87 between teachers' ranks of pupils' mechanical ability and scores from his tests, with medians around .67. MacQuarrie (20) reports that scores on his test never correlated more than .48 with teachers' ratings of mechanical ability. (See also 7.)

There is considerable evidence that the various tests of mechanical ability measure something different from the ability measured by intelligence tests. The correlations between these two kinds of tests are not significant, ranging from .002 to .40 (4, 14, 15, 17, 20, 23, 28, 32), but yet they are positive. Nevertheless, some investigators report subnormal groups making higher mechanical-ability scores than normal groups (21, 28, 29); while others find children of normal intelligence superior on some tests (26, 28).

Whatever abilities are measured by the various mechanical-aptitude tests, they are abilities that seem to improve throughout most of the years of adolescence, as shown, for example, by the age norms of the

Minnesota Mechanical Ability Tests (27), on which median scores on the Paper Form Board rise steadily from ages 11 to 20, and on the Assembly Test and Battery A from 11 to 19. The rise in the medians on the Spatial Relations Test is less regular, especially that of the error scores.

If these norms may be taken at their face value, any courses in industrial arts involving the abilities measured by these tests might well be introduced late in the senior high school, or thereafter. However, there is entirely too much overlapping between ages to draw any such conclusion. The 75th percentile rank of 13-year-olds is approximately the same as the 25th percentile rank of 19-year-olds on all tests except the error score on the Spatial Relations Test and on Battery A (27). The same thing is true of the other mechanical tests (19, 31, 32).

Some attempts have been made to determine by correlations the predictive value of mechanical-aptitude tests for industrial arts (9, 14, 15, 17, 20, 23, 27, 28). The correlations range from .20 to .81 (the median being .46) and indicate that such tests do not furnish an accurate means of prediction. The Stenquist and the MacQuarrie tests do not measure the same thing, since correlations between them are as low as .09 (15) and .29 (4).

There is no justification for assigning pupils to industrial-arts courses just because they are mentally subnormal pupils. "It is an inadequate attempt to solve the difficulty to take children from one situation in which they are failing to another for which they are just as ill-equipped" (28, p. 66).

If mechanical-ability tests offer little hope for grade or age placement of industrial-arts courses, still less can be expected from tests of other motor abilities and skills. Investigation has shown wide divergencies in the correlations between various motor skills (8, 11), which indicate clearly that there is no one general motor ability. It seems probable that some motor skills are essential to achievement in shop courses, but research on the problem is lacking.

6. The Mental Age or Intelligence Quotient Necessary for Success in Industrial Arts

From several studies of the relation of intelligence to achievement in industrial arts the tentative conclusion is drawn that neither M.A. nor I.Q. is a determining factor in success in industrial arts. The coefficients of correlation vary considerably, but very few of them are high enough to have predictive value. Thus Bauersfield (1), using the

University of Chicago General Intelligence Tests with a group of 44 technical course high-school boys just completing a forty-weeks' course in woodworking (one and one-half hours per day) and a group of 45 general course high-school boys who had attended one year without taking any technical work, found correlations ranging from .09 to .33 between intelligence and completion tests of trade knowledge and trade skill. We do not know how valid or reliable the trade tests were, nor do we know the extent to which scores on them may be taken as evidence either of achievement or of ability. Bird and Pechstein (3) found a correlation of .14 between the Stanford-Binet I.Q.'s of 25 vocational-class boys, presumably at junior-high-school level, with scores representing progress in learning fundamental operations on the engine lathe. The boys' I.Q.'s ranged from 71 to 111, with a median of 92. Other studies (12, 15, 17, 28, 33,) show correlations ranging from .003 to .28 between intelligence (M.A. and I.Q.) and various measures of achievement in industrial arts. In one of these (17), although the correlation between intelligence and achievement in pattern-making was only .27, analysis showed that 85 percent of the errors made by pupils were *headwork* errors, not *handwork* errors. Graduate students in one of the author's classes in the summer session at the University of Southern California (1935) found correlations of .14 to .32 between semester marks of 300 California high-school boys in industrial-arts courses and their group-test mental ages.

In one study (35) of younger pupils (100 fifth-grade boys) mental age seems to be a very important factor conditioning achievement in woodworking, sheet metal, and electricity. Intelligence (M.A.) and scores on objective measures of knowledge of principles of woodwork, sheet metal, and electricity correlated .72, .81, and .88, respectively. We are not sure how to interpret these results. The tests of *knowledge of principles* of woodwork, sheet metal, and electricity may not have measured skills in these fields, but merely the so-called theoretical aspects of the subjects. If this is true, the higher correlations are easily accounted for. If, however, the tests really measure broad achievement in these three subjects, then the results may indicate that if these subjects are introduced in the fifth grade, mental age is an important factor in achievement. The other studies on older pupils, then, may be taken to mean that by the time the child has reached the ninth grade he commonly has intelligence adequate for the demands of industrial-arts courses as now organized in our schools. We do not know which interpretation is correct.

With this possible exception our standardized intelligence tests seem to have little value in determining when a boy should begin the study of any of the industrial-arts courses.

7. The Concepts Necessary for Success in Industrial-Arts Courses

A fruitful line of attack upon the problem of the best time to initiate instruction in industrial arts conceivably might be directed toward a determination of the vocabulary development prerequisite to adequate success in such courses. We have been unable to find any study that shows changes in needed industrial-arts concepts with chronological age, mental age, I.Q., or grade reached in school; that is, we do not know the answer to either of the questions, "Just when do children possess the necessary concepts for studying the industrial arts?" or "Just when are they most capable of acquiring them from instruction in industrial-arts courses?"

8. Attitudes and Other Personality Factors and the Placement of Instruction in Industrial Arts

The effect of attitudes upon success in industrial arts courses is not definitely known. Klinge (17) concluded that absence from class had a very definite influence upon achievement in second-year pattern-making. (Of course, absences may be an indication of lack of interest, which is discussed in the next section of this chapter.) He believes that the most important factors in achievement in pattern-making are construction ability, regular attendance, proper mental attributes, interest in work, industry, perseverance, and serious purpose. Pritchard (28), however, found correlations between scores of subnormal boys, ages 12 to 15, on a woodworking project and scores on the Haggerty-Olson-Wickham Behavior Rating Scale, Schedules A and B, of $-.09$ and $+.28$, respectively, and with the Maller Character Sketches of $.17$. Betts and Van Duzee (2) report very low negative correlations between scores on a generalized attitude scale of interest in school subjects and scores on vocabulary tests in industrial fields, such as woodworking, general metal work, and printing. Whatever we may believe about the importance of attitudes as determiners of success in industrial-arts courses, we have little experimental evidence upon which to base conclusions. Here, too, is a fruitful field for research.

9. Interests as Factors Determining Placement

Since the time of Herbart, interest has to an increasing extent been stressed in education. Various writers agree with Cleeton (6) that

industrial-arts courses should largely be based on the interests of pupils. Cleeton suggests that Lehman and Witty's play activity list be used. Referring to it (18), we find that only one play activity relating to industrial arts was engaged in by as many as twenty percent of the boys studied. That activity—"Using a hammer, saw, nails, etc., for fun"—was ranked fourteenth in frequency of play activities by eight-year-old boys. Its successive ranks in frequency at the ages nine to fifteen, inclusive, were 9, 8, 15, 10, 13, 12, 21. After the age of sixteen it was engaged in by less than twenty percent of the boys. Assuming that frequency of play activity is a measure of interest and that interest is the most important criterion of curriculum construction, from these data it would seem that industrial arts should be introduced into the curriculum when boys are ten years old; and furthermore, that it should be dropped from the curriculum when they are sixteen years old. Unfortunately, in the list of play activities *liked best* by boys from eight to twenty-one (18, pp. 55-56) no activity relating to industrial arts appears at all.

Investigation does not support the older idea that interests are periodic. Lehman and Witty found very gradual changes from year to year. They also found that at all ages tools were used for fun more frequently by country boys (18, p. 112) than by town boys; and much less frequently by Negro boys (18, p. 135). Their results indicate that play activities and other interests are different in different generations and in different communities. Accordingly, generalized lists, such as these, are practically worthless for the purposes of curriculum construction. However, studies of industrial-arts interests that would have probable value could be made locally, even though such interests might be relatively short-lived. Vocational interests of high-school pupils show a permanence over a four-year period of ten to forty-two percent (10, p. 156). Even mechanical interests do not seem to be permanent, because Hubbard found an *r* of only .34 between high-school boys' mechanical-interest scores on the Minnesota Interest Test on two occasions separated by fifteen months (10, p. 181).

In the literature on interests there is considerable venturing of opinions, but little producing of evidence that would support any specific conclusions on initiating industrial-arts courses.

10. Need Arising from Home and Community Activities of the Child

It has been proposed that the duties of children that fall in the field of home mechanics be made the basis of curricular construction

in the industrial arts, but no agreement has been reached on the proposal. If learning to understand an industrial civilization is the chief aim of industrial-arts courses, then these home duties of children may not be an adequate criterion for curriculum construction. Furthermore, the rapid changes in industry and the home may outmode too soon any curriculum set up on this basis. At any rate, whatever the values of home mechanics may be for curriculum construction, the research has not been made that would indicate the best age or grade location for each particular activity. This might vary among different communities, and even within families. Thus a twelve-year-old boy, the oldest of a family of children, might have to perform the same home duties as a boy of sixteen whose brothers and sisters, all older than he, are gainfully employed or are away from home. We have been unable to find any studies giving developmental data on these duties pertaining to home mechanics that have definite practical value for placement of instructional materials in industrial-arts courses.

11. Summary and Needed Research

Hunter (16) indicates that little research has been done in industrial arts and warns against making involved mathematical investigations on shaky assumptions.

Determining the best time to initiate instruction in the industrial arts and the most suitable sequence of units or topics in the various courses is not at all a simple matter. Research and conference are needed to reach an agreement on the aims or objectives of such courses, and until this is done the content cannot be selected. It seems reasonably clear that the best time to begin instruction and the best sequence of units cannot be determined until the units or topics have been selected. Given these basic facts and principles, research may then be set up to determine the optimal time for introducing instruction and the optimal sequence of units. The techniques discussed in Chapter XX are appropriate for this undertaking. If the development of certain attitudes and understandings is an aim of industrial-arts courses, then research may be instituted to find out the best time for developing them. Of course, the permanence of such attitudes when developed early versus their permanence when developed late would have to be taken into account. Furthermore, if industrial-arts courses aid pupils in making certain social or other needed adjustments, research may show the best time and sequence for this purpose.

The discussion in the earlier parts of this chapter indicates that

many things have to be considered in determining the best time and sequence. Among these are the aims or objectives, individual differences in needs and capacities (including various home and community factors), growth and maturity of various kinds, varying methods of instruction, the quality of teaching, and the probable length of time the child will remain in school.

At the present time the best chronological, mental, mechanical, or motor age, or the best grade at which to introduce industrial arts, and the best sequence of units are unknown.¹ Research may fruitfully be directed toward giving practical answers to these problems. But before such studies can be made some preliminary fundamental work must be done. Valid, reliable achievement tests in industrial arts are needed, so that investigations can be made of the relative effectiveness of early versus late study of certain specified units. Such tests are a prerequisite to determining the predictive value of various factors that have been enumerated; they will give a sound criterion of achievement in industrial arts that is basic to all investigation of the problem of initial instruction and topic sequence.

II. HOME ECONOMICS

1. Difficulties in Ascertaining the Optimal Time and Sequence of Units in Home Economics

One of the greatest difficulties in determining the optimal time and sequence of topics in home-economics courses arises from the wide variety of aims and the very broad content of such courses. The com-

¹ In 1933 W. L. Hunter, Head of the Department of Industrial Arts at Iowa State College, prepared an annotated list of 800 graduate theses and dissertations pertaining to industrial-arts education. Since then he has kept in close touch with research in this field. In a recent letter he says,

"I am quite certain that you will be unable to find more than five [studies] which shed any light on your problem.

"There are two possible reasons why such studies may not have been made. One is that the relative difficulty of the various operations within a given unit varies tremendously. In ceramics, for instance, children in nursery schools make their own footprints in clay and these are run through a kiln and given to the fond parents for Christmas presents. On the other hand a piece of handmade pottery from Rookwood may sell for as much as \$1,000 for a single vase.

"Another possible reason is that no fixed standards of accomplishment have been set up for any of the units in any of the grades. While all industrial-arts teachers do want a boy to turn out as good a material product as possible, yet most of us also think in terms of certain relatively intangible values which accrue to a boy in the process."

mittee appointed by the American Home Economics Association to revise the 1913 Syllabus of Home Economics has divided the field into five parts (78): (1) the family and its relationships, (2) the house, its equipment and management, (3) family economics, (4) food and nutrition, and (5) textiles and clothing. It has been suggested by many writers (e.g., 65, 68, 75, 76) that the use of home-economics subject matter should help students solve their own personal, social, and family problems by providing a friendly atmosphere in which to think about them, should give them needed information, should set standards and develop fine ideals and attitudes toward family life and home activities, should provide means of self-expression through home arts, and provide actual experiences in social contacts, personal adjustment, and personality growth; in short, that it should cover all phases of home-making and the many problems arising therein.

The objectives of education in home economics have changed materially in the past thirty or forty years. Early in the present century one state set for home economics the goal of providing "an easy course to soften the difficulties of the strictly academic curriculum which serves but to tease the female mind" (41, p. 666). Probably the most notable changes in objectives during the past twenty years lie in stating them in terms of appreciation, attitudes, knowledge, and understanding, rather than as skills, habit formation, and technique. The immediate needs and interests of pupils are given more weight. A shift has been made from emphasis upon production as an end to production as a means to an end (63). According to Spafford (76) home-economics teachers cannot agree once and for all on the objectives of home economics, the subject matter and activities, the kinds of rooms and equipment needed, because "home economics, rightly planned, deals with a unit of society, not a body of organized knowledge. It cannot be treated like history or mathematics, science or language. What is needed would seem to be not a fixed program, but a more clearly defined sense of direction" (77, p. 3).¹

The problem of placement is further complicated by the rapid changes in home activities performed by students. Then, too, studies have shown that the relation between knowledge and behavior in this field is slight (41). Thus, information about art principles and the ability to recognize and identify certain types of architecture are not proportional to taste in home architecture. There seems to be very little relation between information about food values and the ability to

¹ See also References 39, 40, 41, 45, 48, 49, 55, 56, 57, 60, 63, 70, 74, 81, and 83.

prepare a well-balanced and palatable meal, and probably very low correlation between ability to do skillful hand-sewing and accurate machine stitching and the ability to make an attractive and well-fitting garment (41). Information may be acquired, and then not be applied in any significant way.

2. Factors Influencing the Time of Introducing Home Economics and the Sequence of Units

Developmental factors to be considered in the grade placement of home-economics units are chronological age or grade, intelligence, social maturity, interests and attitudes, and needs arising from home and community activities. Non-developmental factors include size of school, type of community (rural, urban, industrial, and the like), organization and methods of instruction (including individualization by various plans), length of time students will be in school, relative values of home-economics courses and the other courses that would displace them, and the sequence of topics in other related and contributing subjects. Home economics often helps coördinate material taught in other subjects as more or less isolated content (82, pp. 13-14). The sequence of related work in science, art, and social science is likely, then, to be one determiner of the sequence in home economics. In fact, such a program has been suggested in Home Economics Circular No. 9, U. S. Bureau of Education, 1920. The topics and projects for Grades VII, VIII, and IX are correlated for each term with other subjects, such as general science, hygiene, bookkeeping, art, arithmetic, geography, and social studies.

3. Chronological Age or School Grade as the Basis of Placing Home-Economics Courses

We have been unable to find any conclusive study of the best age or grade placement of the units of home-economics courses. A type of investigation much needed on this problem is that by Segner who compared the initial and the final scores on two food tests made by 300 girls in Grades VII, VIII, and IX. According to Segner's results, one of these grades could master this foods unit about as well as another.¹ Further investigation with other units might well report data

¹ Esther F. Segner, Assistant Professor of Home Economics, University of Idaho, transmitted a summary of her master's thesis at the University of Wisconsin from which these statements are taken.

by chronological age, mental age, and social maturity as well as by grade and might cover a wider range.

Sometimes home-economics courses include much material on design, home decoration, and other topics involving artistic ability. To the extent that such ability is involved in home-economics courses and to the extent that the Meier-Seashore Art Judgment Test measures artistic ability, the norms on the test (67) may be suggestive. The median score for Grades VII and VIII is 84; for Grades IX and X, 90; and for Grades XI and XII, 95. These data seem to indicate that artistic ability tends to increase with age. We would hesitate, however, on the basis of such indications alone, to advise the postponement of home-economics work involving artistic ability until the eleventh or twelfth grade.

4. Intelligence as a Factor in the Placing of Home Economics

A wide range of intellectual demands are made by various kinds of home-economics work. Two types of studies bearing on this problem have been made. The one investigates the intelligence of persons engaging successfully in home-economics courses or vocations, and the other determines the correlation between intelligence and ability in home-economics courses. Unger and Burr (80) report on a study of the former type. The Vocational Adjustment Bureau for Maladjusted Girls in New York City studied the occupational success of 2465 girls. Time spent on the job was the criterion of success. The results are as follows:

- M.A.:6. Various light factory jobs performed successfully, such as stamping, polishing, packing.
- M.A.:7. Assembling, examining, pasting, and errand girl jobs.
- M.A.:8. Cutting, folding, garment-machine operating.
- M.A.:9. Hand-sewing of various types, press-machine operating, filing, stockroom service.
- M.A.:10. Simple clerical jobs.
- M.A.:11. Successful selling.

Anderson (37) found that 250 retarded adolescent girls, in special classes, but having part-time employment out of school hours, had median I.Q.'s of 66, but median social maturity quotients (to be discussed shortly) of 86. A group of regular junior-high-school girls of similar age had average I.Q.'s of 92 and social maturity quotients of 93. Further research is needed, however, on this problem.

Students who elect home-economics courses seem to be slightly below the average intelligence of those who do not elect them (42, 50).

The few correlations between achievement in home economics and intelligence that we have found indicate only a slight positive relationship, the coefficients ranging from .20 to .40 (50, 54, 64). That pupils who do poorly in mathematics are not likely to do well in home economics is suggested by Engle's correlation of .67 between the marks in the two subjects (50).

We have found no data on the intelligence levels necessary for success in any specified units of home economics.

5. Social Maturity and the Introduction of Home Economics

It was suggested in the last section that an individual's social maturity may at times be more significant than his intellectual maturity. The Vineland Social Maturity Scale (46) has been designed to measure "progressive development in social competence" in the same way that the Binet-Simon scale measures intelligence. Some of the items may be significant for the age or grade placement of home-economics units, but the research on this point has yet to be made.

The "Tests of the Socially Competent Person" (69) contain items relating to health, personal economics, family and community relationships, and social-civic matters. Norms are provided for typical schools and for superior schools over Grades VII to XII. The value of these tests for the placement of home-economics units has not been determined. It might be assumed that certain levels in social development would be needed for the achievement of various objectives in home economics, but we have not discovered any conclusive evidence on this point. (See also 71, 72.)

6. Interests and Attitudes as Factors in the Placement of the Content of Home-Economics Courses

Several writers in the field of home-economics education emphasize the importance of interests in the selection and placement of materials in courses. Many of them make general statements regarding the interests of junior- or senior-high-school girls, statements that are apparently based on personal opinion or casual observation. In discussing the different units in home economics, Kauffman (61) stresses the rôle that pupils' interests should play. Foods, she believes, should be taught on the meal basis; the meal to be planned and prepared should depend upon the interest of the group. The unit on clothing,

she insists, can be made personal and real both for junior- and senior-high-school girls; the problems each pupil should set up for herself are, "How can I dress to make myself more attractive?" and "What are my wardrobe needs?" She declares that high-school girls of all ages are interested in the human relationships of the home, in child care and training, and in hospitality and entertaining. She advocates, therefore, that home management should be included as a part of the home-making course from the seventh grade up (61, p. 122).

In a study of seventh-grade girls, Brown¹ found that they desired most to be important and helpful and to appear grown up. They were particularly energetic, and preferred activities involving motion, novelty, and variety. Experimenting, inventing, and doing creative things appealed to them, but they demanded immediate results. The desire for popularity was strong; it led to a request for knowledge about accepted social customs. Miss Brown recommended several modifications of the home-economics curriculum at the seventh-grade level on the basis of this study of the pupils' interests. Among her recommendations were the following: inclusion of several short units in different fields; provision for more activity; placement of foods work before clothing work; teaching supper foods rather than breakfast foods, and party foods rather than plain ones; emphasis in sewing projects on machine sewing and decorative needlework closely related to art instruction; provision, in the child-care unit, of contact with children of the pre-school or kindergarten level; and emphasis on personal relations.

General studies of interests and free-time activities of girls furnish few data of value in constructing home-economics curricula. Lehman and Witty (62, pp. 53-57) found that playing house declined rapidly in frequency as a play activity shortly after the age of eleven. The frequency of visiting or entertaining company steadily increased with age: its rank in frequency, as compared with the other play activities, for the ages ten to eighteen, inclusive, were, respectively, 27, 17, 15, 15, 14, 9, 7, 6, 6. The popularity, however, of entertaining was apparently not so great as its frequency of occurrence. It was not recorded as liked by as many as 20 percent of the girls under sixteen years of age. For the ages sixteen to eighteen, inclusive, the ranks in popularity of entertaining were, respectively, 11, 8, 10. For the younger girls, sewing, knitting, and crocheting for fun were more popular than entertaining, although the frequency of occurrence was less. The ranks in popularity

¹ Clara M. Brown, Division of Home Economics, University of Minnesota. The data included in this paragraph were furnished to one of the writers in a letter.

of sewing, knitting, and crocheting for the ages ten to fifteen, inclusive, were, respectively, 6, 9, 6, 5, 8, 9; for girls over fifteen the activity was well liked, but could not be ranked in popularity.

Studies show, in general, little significant relationship between educational interests and educational ability. Columba (52, pp. 229-230) compared the achievement quotients (on the Stanford Achievement Test) of pupils who preferred certain school subjects with the achievement quotients of the rest of the pupils in a class. No significant differences in achievement between the two groups were found. Fryer (52, p. 232) estimates that .30 represents the average correlation between interest and achievement.

Local studies of the interests of pupils in a given community, school, or neighborhood, in contrast to general studies, however, may furnish decidedly valuable results for local courses in home economics. It seems probable that such results would affect placement and sequence of emphases rather than of units of content as such. Dunlap (47) asked 1384 high-school girls what they wanted to know about their clothes. Combining the results, we find that 49 percent were interested in the appearance of clothing, 25 percent in financing and planning, and 26 percent in the making of clothing and its care. Brown (41) reported that ninth-grade girls expressed a greater interest in how to entertain their friends than in anything else. (See also 38, 44.)

7. Needs That Arise from Home Activities as a Factor Determining Placement

An investigation, carried on by a committee of the Wisconsin Home Economics Association under the chairmanship of Miss Ruth E. Michaels, Dean of the Division of Home Economics, The Stout Institute, reports girls' participation and interest in various home activities by grades throughout the junior and senior high school.¹ The results were tabulated under (1) foods, (2) house, (3) clothing selection and management, (4) care of clothing, and (5) care of person. Under each of these groups were listed 29, 26, 22, 13, and 10 activities, respectively. Such activities as setting the table, putting the dishes away, considering the color of clothing, and cleaning shoes were performed by the great majority of girls in Grades VII to XII, but the percentage of girls enjoying them decreased with increasing age. From the standpoint of

¹ Since the material was collected for revising the course of study in home economics, it has never been published. All data included in this chapter referring to the Wisconsin study were furnished by Miss Ruth E. Michaels.

interest, then, if such items are included in home-economics courses, it would seem that they should appear as early as possible — not later than the seventh grade.

In food activities there was a fairly high correlation between participation and enjoyment. The percentage of participation in planning and preparing meals increased from grade to grade; buying foods showed no such increase with age. A large number of the activities showed no regular increase, either in participation or enjoyment; rather the percentages were variable from grade to grade.

More girls engaged in the household activities listed than in the food activities, but relatively fewer enjoyed the household activities. In the case of several activities there was a decided drop after the seventh grade in the number of girls enjoying the tasks. The decline from the seventh to the twelfth grade in percentage enjoying each of the following activities was, respectively, washing dishes, 67 to 46; cleaning silverware, 72 to 42; washing windows, 72 to 35; cleaning the bathroom, 72 to 33; and running the vacuum cleaner, 89 to 58. Thus, if any of these, or similar, activities are to be included in the course of study, it might be wise to teach them during the earlier years.

The percentage of girls enjoying the selection and making of clothing was higher than in the case of any other type of activity except care of the person. Few items in this class revealed a striking decline from the seventh to the twelfth grade in the percentage of girls enjoying them. The principal exceptions were: considering the cost of clothing, 89 to 51; keeping an expense account, 61 to 27; and helping to keep an expense account, 39 to 22. The fact that fewer girls in the senior than in the junior high school enjoyed these essential activities might also be interpreted as a measure of the effectiveness or lack of effectiveness of their work in home economics.

The participation in activities listed under care of clothing was high, but the enjoyment was relatively low. Since these activities were performed by so many girls, it might be a function of home-economics courses to stimulate greater interest in them. In the case of no activity did the percentage of enjoyment increase to any significant extent from grade to grade, whereas in several activities the number of girls enjoying them decreased markedly from the first year of the junior high school to the last year of the senior high school.

The percentage participating in, and the percentage enjoying, activities involved in care of the person were the highest of any category. One would expect an increase from the seventh to the twelfth grade in

the frequency and enjoyment of such activities as shampooing the hair, using powder, face cream, and rouge. It is doubtful, however, whether either the motivation for, or the skill required in, these arts was particularly affected by instruction in home-economics courses. (See also 45, 59, 66, and 73 for additional data on home activities.)

The conditions existing in pupils' homes should be of more than casual interest to the maker of the home-economics curriculum. The survey conducted by the Minnesota State Board of Education showed that most of the houses in rural counties and in small towns were from ten to twenty-five years old; a fifth of them were more than twenty-five years old. In smaller towns one-third of the homes lacked modern conveniences. What, Brown (41) pertinently asks, should be the content of a unit in home planning and furnishing to meet those conditions? Two-thirds of the families that were studied ate most of their meals in the kitchen. One-third of the girls had a bedroom alone, and one-third shared a bedroom with more than one person. But, as Brown remarks, units on the bedroom in home-economics courses include nothing about "how to share a room with others." Rather, the usual emphasis is on "How can I make *my* room more attractive? How can I keep *my* room neat and clean?" (41, p. 669).

Just what conclusions regarding the proper placement of any particular units in home economics can be drawn from the studies that have been cited? Theoretically, it seems desirable to introduce any item of instruction at the precise moment when it is most useful to the individual; there are obvious psychological and social advantages in doing so. But unfortunately, at the precise moment when a particular item of content might be tremendously useful and engrossing to one girl of fifteen the same item might be totally alien to the experience of another fifteen-year-old girl. That does not mean that surveys of home activities are worthless. The study conducted by the Wisconsin Home Economics Association, described earlier in this section, furnished some very valuable data — for Wisconsin. Even children from a similar social environment vary greatly in the experiences they have had (43). High-school girls come from diverse types of homes, differing racially, in economic levels, in urban or rural status, in sections of the country, in standards of living, in customs, and in many other factors. However, Brown (41) suggests that many tasks are "common to any community — rural or urban, eastern, southern, or middle-western," and that these common problems could be emphasized in home economics.

Even in a relatively homogeneous state, such as Minnesota, surveys

reveal wide diversity in home practices. The State Board of Education survey of 6165 homes in towns of differing size showed (53) that the percentage of homes in which the family washing was done at home rose from 66 percent in cities over 25,000 population to 90 percent in cities under 1000. In the same groups of cities the percentage of high-school girls who enjoyed doing the laundry rose, respectively, from 9 percent to 23 percent. Similar differences that are functions of the size of the city were found (79) in the cleaning and pressing of clothing.

Winchell (82, p. 1) warns against overstandardizing the home-economics content.

Home economics is a subject which is fundamentally a response to social and economic needs. . . . Obviously, then, home economics as a school subject is less possible of standardization than are some other subjects which are more easily organized in terms of their inherent content. Unless home economics is taught in terms of the individuals and of the community to whose life it is to contribute, it fails of accomplishing its purpose.

The search for common elements, the desire for standardization, the hope of developing a sequence that is *universally valid* — these aims are easily understandable. But Winchell (82, p. 122) points out their falacious nature in the following words:

While the dietetic needs may be uniform for all, the epicurean, gastronomic, and psychological demands vary; utility and appropriateness may be common to all clothing needs, but clothing as a vocational and social asset is more important under some circumstances than under others; furthermore, homemaking when carried on by a full-time homemaker is a different activity from homemaking carried on as an avocation by the professional woman. One superintendent of schools writes, "It seems to me that it is possible and feasible to evaluate a course of study in household arts by using fundamental principles of measurement just as it is possible to evaluate a course of study in arithmetic, *knowing that the courses of study are to be adapted to local and individual needs.*" All of which may be well and good, but why not determine and provide for the "local and individual needs" in the process of modernizing and humanizing the home-economics curriculum for the specific community?

8. Research Needed for Better Placement of Instruction in Home Economics

So little information is available on child development as related to the best time for introducing instruction in home economics and the

best sequence of units therein that this is an almost virgin field for research. Apparently money will be available for some of this research (51), and it is hoped that plans for carrying forward the investigations will be adequate. Spafford's (76, p. 5) suggestions are:

Experimentation is needed to find out the minimum in time and basic operations needed to teach a girl to cook [and we would add, at different age, grade, or other levels], not to develop a high degree of skill but to secure the fundamentals in actual food preparation, the meaning of terms, the interpretation of recipes, the standards for finished products, and pride in good work. Proficiency can come later as she prepares food for people who need it. A distinction could then be made between those things which should be taught at school and those which can be acquired through self-teaching built on school learnings. All areas dealing with techniques, food preparation, clothing construction, housekeeping and care of children offer fields for experimental study in reducing school time without sacrificing the learning which should be attained under the teacher's direction.

The placement of units and their sequence in the various divisions of the schools have been determined, obviously, thus far more by opinion than by the results of research (77). Further exploration of student interests, abilities, home activities, and needs at different ages, grades, or positions in the family circle are needed, as well as studies of the content and activities suitable for different specific types of groups—groups that are otherwise comparable but that differ (1) in mental capacity, (2) in social maturity, (3) in economic status, (4) in environment and home standards, or (5) in breadth or range of home experiences. Such studies should be made by techniques that are not so time-consuming that the results are out-of-date before they are finished. National market surveys often are completed within a week. A carefully selected limited sample may be adequate—witness the 1936 Gallup poll, the inaccuracy of which was not more than five percent in any state.

Tests are needed to measure the objectives of home economics, especially tests to measure adequately the acquisition of ideals, attitudes, appreciations, and the like. The way in which an activity is carried out should be measured. A girl may serve a nicely prepared meal and may have learned a great deal about cooking, but the actual preparing of the meal should be checked to see whether she employs poor management practices and inefficient or wasteful work habits (76).

9. Summary

1. We have found little research in the field of home-economics education, though much in the field of home economics.
2. Crucial information on the best time to introduce instruction in home economics and the optimal sequence of units seems to be lacking.
3. We have found no evidence that most home-economics units, as far as difficulty is concerned, could not be taught in any grade from the seventh to the twelfth.
4. If the objectives of home-economics courses frequently mentioned by the leaders in the field be accepted as valid, then it would be neither possible nor desirable to standardize either placement or sequence of topics, because preparation for effective home life is likely to vary with the locality, the social background, and the economic status, all of which themselves are changing rapidly. Then, too, students' interests are likely to be transitory.
5. The chief value of the studies on interests, needs, and home activities referred to in this chapter lies in their local, rather than their general, applicability to widely different communities.
6. Studies of the types reported in this chapter, especially those on interests and on home and community needs and activities, should be made locally and at short or frequent intervals because of the rapid changes that are taking place.

BIBLIOGRAPHY

Industrial Arts

- (1) BAUERSFIELD, A. G. "Application of standard tests and measurements in the manual arts." *Industrial Arts Magazine*, 18: 1924, 14-19.
- (2) BETTS, G. L., and VAN DUZEE, R. R. "Interest and learning." *Industrial Arts and Vocational Education*, 25: 1936, 135-136.
- (3) BIRD, V. A., and PECHSTEIN, L. A. "General intelligence, machine shop work, and educational guidance in the junior high school." *School Review*, 29: 1921, 782-786.
- (4) BOARD, EDNA; MARSH, WILLA; and STOCKWELL, L. E. "The relation of general intelligence to mechanical ability." *Industrial Arts Magazine*, 16: 1927, 330-332.
- (5) BUTLER, F. D. "Industrial work in the junior high school." *Industrial Arts Magazine*, 15: 1926, 153-154.
- (6) CLEETON, G. U. "Planning industrial arts courses." *Industrial Arts and Vocational Education*, 23: 1934, 170-171.
- (7) CROCKETT, A. C. "Measure of manual ability." *Journal of Applied Psychology*, 14: 1930, 414-426.

(8) ENGLISH, H. B. "Experimental study of motor capacity of school children correlated with social status" *Psychol. Monographs*, 23: 1917, 266-331.

(9) FENN, I. M. "Information and mechanical aptitude" *Industrial Arts and Vocational Education*, 26: 1937, 8-9.

(10) FRYER, DOUGLAS. *The Measurement of Interests*. (New York: Henry Holt and Co., 1931. 488 pp.)

(11) GARFIEL, EVELYN. *The Measurement of Motor Ability*. (New York, Archives of Psychology, 62: 1923. 47 pp.)

(12) GORDON, GEORGE. "The relation of the pupils' intelligence quotients to their grades in the high school shops." *Industrial Education Magazine*, 30: 1928-29, 249-250.

(13) HENIG, MAX S. "Individualizing the instruction." *Industrial Arts and Vocational Education*, 24: 1935, 325-326.

(14) HORNING, S. D. "Testing mechanical ability by the MacQuarrie Test." *Industrial Arts Magazine*, 15: 1926, 348-350.

(15) HORNING, S. D. "Tests of prognostic value in mechanical drawing." *Industrial Education Magazine*, 29: 1927-28, 441-444.

(16) HUNTER, W. L. "Research in industrial-arts education" *Industrial Arts and Vocational Education*, 21: 1932, 1-2

(17) KLINGE, L. R. "Student achievement factors." *Industrial Arts and Vocational Education*, 23: 1934, 305-308.

(18) LEHMAN, H. C., and WITTY, P. A. *The Psychology of Play Activities*. (New York: A. S Barnes and Co., 1927. 242 pp.)

(19) MACQUARIE, T. W. *MacQuarrie Test for Mechanical Ability*. (Hollywood, California, Southern California School Book Depository. 8 pp.)

(20) MACQUARIE, T. W. "A mechanical ability test." *Journal of Personnel Research*, 5: 1926-27, 329-337.

(21) McELWEE, E. W. "Standardization of the Stenquist Mechanical Assembling Test, Series III." *Journal of Educational Psychology*, 23: 1932, 451-454.

(22) METCALFE, ZAIDA, and BURR, E. T. "A practical form of the Girls Mechanical Assembly Test." *Journal of Applied Psychology*, 20: 1936, 672-679.

(23) NEWKIRK, L. V., and GREENE, H. A. *Tests and Measurements in Industrial Education*. (New York: John Wiley and Sons, Inc., 1935. 253 pp.)

(24) NEWKIRK, L. V., and STODDARD, G. D. "The teaching content and objective testing in home mechanics." *Industrial Arts Magazine*, 17: 1928, 47-50.

(25) OSBURN, B. N. "Criteria of curriculum construction." *Industrial Arts and Vocational Education*, 25: 1936, 229-231.

(26) PAGE, M. L. "The mechanical ability of subnormal boys." *Journal of Applied Psychology*, 17: 1933, 164-181.

(27) PATERSON, D. G.; ELLIOTT, R. M.; ANDERSON, L. D.; TOOPS, H. A.; and HEMBREDER, EDNA. *Minnesota Mechanical Ability Tests*. (Minneapolis: University of Minnesota Press, 1930. 586 pp.)

(28) PRITCHARD, MIRIAM C. *The Mechanical Ability of Subnormal Boys*. New York. Bureau of Publications, Teachers College, Columbia University, 1937.

(29) RILEY, G. "Stanford-Binet 'indicators' of mechanical ability." *Psychological Clinic*, 18: 1929, 128-132.

(30) SMITH, HOMER J. "Beliefs about industrial arts" *Industrial Arts and Vocational Education*, 23: 1934, 3-6.

(31) STENQUIST, J. L. *Stenquist Assembling Tests of General Mechanical Ability*. (Description and Manual of Directions). (Chicago: C. H. Stoelting Co., 1922 15 pp.)

(32) STENQUIST, J. L. *Stenquist Mechanical Aptitude Tests* (Manual of Directions). (Yonkers, New York: World Book Company, 1922. 21 pp.)

(33) SUTHERLAND, S. S. "Correlation between intelligence and skill in shopwork." *Industrial Arts Magazine*, 17: 1928, 204-205.

(34) VOTH, J. J., and HUNTER, W. L. *Objectives of Industrial Arts Education*. (Ames, Iowa: Industrial Arts Department, Iowa State College, 1933)

(35) WILLIAMSON, R. S. "Correlation of achievements." *Industrial Arts and Vocational Education*, 23: 1934, 125.

(36) YAGER, S. A. "Selecting general shop courses." *Industrial Arts and Vocational Education*, 24: 1935, 359-360.

Home Economics

(37) ANDERSON, META L. "Education for social maturity." *Training School Bulletin*, 33: 1937, 185-192

(38) BARTLETT, ELLEN M. "Home economics program in San Francisco" *Practical Home Economics*, 8: 1930, 233-234.

(39) BAYLOR, ADELAIDE S. "Reappraising values in home economics." *Journal of Home Economics*, 26: 1934, 405-409.

(40) BRODSHAUG, MELVIN. *Buildings and Equipment for Home Economics in Secondary Schools*. (New York: Teachers College, Columbia University, Bureau of Publications, 1932. 178 pp.)

(41) BROWN, CLARA M. "A forward look in home-economics education through the public-school curriculum." *Journal of Home Economics*, 25: 1933, 665-672.

(42) BROWN, CLARA M., and KELLER, LOUISE. "The prognostic value of the honor-point ratios of home-economics students." *Journal of Home Economics*, 24: 1932, 54-58.

(43) CHASE, SARA E. *Individual Differences in the Experiences of Children*. (Unpublished master's thesis, University of Chicago, 1927)

(44) CONNOR, RUTH. "Suggested interests of adolescent girls and boys." *Journal of Home Economics*, 24: 1932, 886-887.

(45) COON, BEULAH I. "Adjustment of home-economics content at the secondary-school level." *Journal of Home Economics*, 26: 1934, 220-226.

(46) DOLL, E. A. *The Vineland Social Maturity Scale*. (The Training School at Vineland, New Jersey, 1936. 30 pp.)

(47) DUNLAP, MABEL. "What high-school girls want to know about their clothes." *Practical Home Economics*, 8: 1930, 139-140.

(48) DYER, ELIZABETH. "Home economics as an integrating force in education." *Journal of Home Economics*, 21: 1929, 482-487.

(49) ELLS, MRS. MARGARET C. "What employers expect of junior-high-school girls trained in home economics." *Journal of Home Economics*, 21: 1929, 560-565.

(50) ENGLE, EDNA M. "How intelligent is the girl who elects home economics?" *Journal of Home Economics*, 21: 1929, 171-178.

(51) FALLGOTTER, FLORENCE. "Developments in vocational education under the George-Deen Act as they relate to home economics." *Journal of Home Economics*, 30: 1938, 305-309

(52) FRYER, DOUGLAS. *The Measurement of Interests*. (New York: Henry Holt and Company, 1931. 488 pp.)

(53) GEHRS, LILLY B. *A Study of Certain Home Management Practices Carried on in Homes of Minnesota High School Girls*. (Unpublished master's thesis, University of Minnesota, 1930)

(54) HAGEN, ELLA J. *Relation between Ability in Hand Sewing, Mental Ability, and General Academic Achievement*. (Unpublished master's thesis, University of Kansas, 1920. 95 pp.)

(55) HARAP, HENRY. "Home economics in a changing economic order." *Journal of Home Economics*, 25: 1933, 451-456

(56) HARAP, HENRY., and GROSMEHR, HELEN K. *Home Economics Objectives from Studies of Home Life*. (Nashville, Tenn.: George Peabody College, 1933. 38 pp.)

(57) HERRINGTON, EVELYN M. *Homemaking: An Integrated Program*. (New York: D. Appleton-Century Company, 1935. 205 pp.)

(58) *Home Economics Courses of Study for Junior High Schools*. (Home Economics Circular No. 9, U. S. Bureau of Education, Washington, Government Printing Office, 1920. 14 pp.)

(59) JOHNSON, MILDRED. *Out-of-School Activities of Junior High School Girls at Muncie, Indiana*. (Unpublished master's thesis, Iowa State College, 1929)

(60) JUSTIN, MARGARET. "Trends in home economics" *Journal of Home Economics*, 21: 1929, 711-716.

(61) KAUFFMAN, TREVA E. *Teaching Problems in Home Economics*. (Philadelphia: J. B. Lippincott Company, 1930. 176 pp.)

(62) LEHMAN, H. C., and WITTY, P. A. *The Psychology of Play Activities*. (New York: A. S. Barnes and Company, 1927. 242 pp.)

(63) LYBARGER, ELIZABETH, and PRESSEY, ALICE D. "Home economics: 1914 and 1935." *Journal of Home Economics*, 28: 1936, 1-4.

(64) MARTENS, ELISE H. "Educational programs for adolescents." *Journal of Home Economics*, 29: 1937, 437-441.

(65) MAYS, ARTHUR B. "The new significance of the practical arts." *Journal of Home Economics*, 27: 1935, 518-520.

(66) MCARTHUR, LAURA J. *A Study of the Home and Family Situation of the High-School Girl*. (Unpublished master's thesis, University of Minnesota, 1932)

(67) MEIER, C. N., and SEASHORE, C. E. *The Meier-Seashore Art Judgment Test; Examiner's Manual*. (Iowa City, Bureau of Educational Research and Service, State University of Iowa, 1930. 24 pp.)

(68) MILLER, ELLEN. "Home-economics subject matter in teaching family and social relationships." *Journal of Home Economics*, 27: 1935, 637-640.

(69) MORT, P. R.; SPENCE, R. B.; ET AL. *Tests of the Socially Competent Person, Scales and Manual of Directions*. (New York: Bureau of Publications, Teachers College, Columbia University, 1937)

(70) NOFSKER, JULIA F. "Home-economics objectives as shown in a survey of educational literature." *Journal of Home Economics*, 24: 1932, 353-364.

(71) OJEMANN, R. H., ET AL *Researches in Parent Education, III.* (Iowa City: University of Iowa Studies in Child Welfare, 1934. 391 pp.)

(72) OJEMANN-SUNDERLIN. *Self-Reliance Scale, Elementary-School Age.* (Mimeographed copy supplied by R. H. Ojemann, State University of Iowa, Iowa City.)

(73) PAYNE, RESEDA B. *Investigation into the Buying Experiences of Fifth- and Sixth-Grade Girls at Jackson School.* (Unpublished master's thesis, University of Cincinnati, 1932)

(74) RIATT, EFFIE I. "The nature and function of home economics." *Journal of Home Economics*, 27: 1935, 265-273

(75) SPAFFORD, IVOL. "The contribution of home economics to general education." *Journal of Home Economics*, 27: 1935, 520.

(76) SPAFFORD, IVOL *Fundamentals in Teaching Home Economics.* (New York: John Wiley and Sons, Inc., 1935. 424 pp.)

(77) *Suggestions for Studies and Research in Home-Economics Education.* (Bulletin No. 166, Home Economics Series No. 15, Washington, Government Printing Office, 1932. 77 pp.)

(78) "Tentative revision of the syllabus of home economics." *Journal of Home Economics*, 27: 1935, 11-16, 152-158; 28: 1936, 157-163.

(79) THOMPSON, ALICE E *A Study of the Practices in the Homes of High-School Girls in Minnesota Relative to the Care and Repair of Clothing.* (Unpublished master's thesis, University of Minnesota, 1931)

(80) UNGER, EDNA W., and BURR, EMILY T *Minimum Mental-Age Levels of Accomplishment.* (Albany: University of the State of New York, 1931. 108 pp.)

(81) WATSON, G. B. "Education for new homes and new economics." *Journal of Home Economics*, 25: 1933, 651-659

(82) WINCHELL, CORA M. *Home Economics* (New York: Bureau of Publications, Teachers College, Columbia University, 1931. 151 pp.)

(83) WOODHOUSE, D. G "Home economics and the new social philosophy." *Journal of Home Economics*, 26: 1931, 401-404.

CHAPTER VI

MUSIC

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I. GENERAL DEVELOPMENTAL TRENDS

The development of musical appreciation and performance follows, in broad outline, the trends that can be observed in other aspects of development. General awareness and responsiveness precede finer appreciation and discrimination. Gross muscular response precedes the capacity for finer coördinations. Children give a bodily response to music while yet in the cradle, and at a later stage they spontaneously walk, hop, and clap to the accompaniment of music. In such early efforts, the child will synchronize his movements with the rhythmic pattern of music long before he can keep exact time with individual beats. His first attempts at singing, likewise, may precede, by varying amounts of time, his ability to talk, or to enunciate the words of songs, or to reproduce the exact pitch. Moreover, he is likely to execute, in his singing, many differences in pitch and time that he may be unable to discriminate or verbalize correctly when his perceptions and judgments are measured by means of a test.

II. RESEARCH STUDIES IN MUSIC IN GENERAL

In the vast research literature¹ dealing with music there are few systematic findings that can be applied directly to the practical problem of what to teach children, and when. Seashore's outstanding studies have provided means of measuring certain elements of musical ability (26, 27, 28, 29). These tests, as well as supplementary ratings and measurements, have been widely applied to children and adults (28, 31, 32, 33, 34, 35). The Kwalwasser-Dykema and Kwalwasser-

¹ Several reviews of the experimental literature and discussions of educational problems are available (1, 2, 16, 22). A recent book by Mursell (21) reviews the general field of research in music. A descriptive bibliography of diagnostic and achievement tests in music has been prepared by Flemming and Flagg (7).

Ruch test batteries have likewise been used as a diagnostic tool (18, 19, 20). It has been pointed out, however, that we have no measures of important factors in musicality such as awareness of tonal-rhythmic configurations, or emotional responsiveness thereto (21). The standard tests are weighted heavily in the direction of measuring sensory capacity. While poor sensory capacity is a serious impediment, tests dealing with such capacities tend to reveal handicaps and disabilities rather than positive abilities.

III. STUDIES APPLYING PRIMARILY TO YOUNG CHILDREN

1. Studies of Singing

Studies of singing at the preschool level have yielded divergent results, both as regards the extent of children's abilities and also as regards the effects of training. In an investigation by Jersild and Bienstock (12, 14), 18 children, with an average age of 38 months, and an age range from 31 to 48 months at the beginning of the study, received training in singing tones and intervals during 40 ten-minute sessions, distributed over a period of about six months. These children were compared with a control group at the beginning and at the end of the training period, and again five months later. Each child's performance was scored on the basis of the judgment of musically trained adults. The child received credit if, in the judgment of the tester, he correctly reproduced a given tone or interval during one or more of several successive trials. The trained children made such unexpectedly large gains that it was necessary, after the beginning of the experiment, to extend the length of the test from 11 to 18 tones (which still proved insufficient to measure the gains made by some children) and from 12 to 22 intervals. At the end of the training period, the practiced children sang almost twice as many tones as did the initially equivalent control subjects (the respective average scores were 10.72 and 6.44 on a test of 11 tones; and 15.5 and 8.0 on a test of 18 tones). The practiced children still showed a substantial superiority when both groups were re-tested five months after the training period had been discontinued. In the singing of intervals, the children who received practice likewise excelled the control subjects (the former had an average score of 17.0, the latter, 10.2, at the end of the training period; the respective average scores five months later were 19.0 and 9.84).

The procedure used in the foregoing study was repeated, with important supplements, and a larger number of children, in a study by Updegraff, Heiliger, and Learned (36). Groups of three-, four- and

five-year-old children who received special training, on thirty to forty different occasions, were compared with control subjects. The measurements included tests of the singing of tones, intervals, and three-, four-, and five-note phrases, as well as daily records of the interest displayed by the children during the course of the study. The children at each age level made consistent and substantial gains as compared with control subjects, although some of the differences were not statistically significant. Tests of the singing of phrases proved to be the most discriminating. It was found that the ability of children to reproduce phrases showed a normal increase with age, but over and above this, the ability could be improved substantially by means of training at each age level. Training (to the extent of 30 practice periods) brought the three-year-olds up to the initial level of the four-year-olds, and the four-year-olds became practically equal in ability to the five-year-olds. The authors point out that since the singing of phrases rather closely corresponds to the demands of singing a simple melodic line, this improvement in the singing of phrases is especially significant.

In view of the gains accomplished through training, the findings obtained by Updegraff, Heiliger, and Learned in measurements of the interest displayed by the children are especially significant. Signs of interest, satisfaction, enjoyment, and appreciation were recorded, and served as the basis of ratings. The results show that the increase in ability that came with training was paralleled by an increased interest and desire to participate in musical activities. The data indicated also that the training periods gave the children more self-confidence, more interest in learning, and greater apparent enjoyment of group activities in music. These effects were not only evident during training but also appeared to carry over to the customary music activities of the school.

The findings cited above, while dealing only with limited aspects of singing, suggest that children of preschool age can profit considerably from a program of training that goes beyond the musical experiences customarily provided in the nursery school and kindergarten. In both of the studies the children received much individual attention and many techniques were used to enlist their interest and effort. A study by Hissem also showed that preschool children improved with practice (11).

On the other hand, the evidence in some experiments has gone against the trend of the findings just reviewed. In a study by Williams (38), children aged four and five years received training in singing songs; the songs were presented vocally and by piano to children in

groups, during two periods a day for thirty days. Children were tested by means of a dictaphone technique, at various stages of the training period. Practice in learning the melody of a song in this way resulted in gains from the tenth to the thirty-first trial, but many of the children showed a poorer performance on the sixtieth than on the thirty-first trial. Williams interprets this result as due to boredom with the song. It is possible that different results might have been obtained if more individual attention had been given to the members of the group and if a larger variety of songs had been employed.

An experiment by Hattwick (8) included tests of children's performance in singing tones and intervals, as well as tests of children's grasp of verbal concepts associated with music. In one series of tests involving preschool and first- and second-grade children, the subjects listened as intervals were played and were instructed to indicate whether the second tone "went down" or "went up." In preliminary trials they were free both to look and to listen as the intervals were sounded, but subsequently they had to respond to the sound alone. Success on this series of tests (as measured by 90 percent accuracy on several trials) was achieved by less than half of the children below seven years. Hattwick also measured children's ability to reproduce the direction and pitch of intervals. In a study of the effect of practice, he found that the children below the age of five years showed little improvement in the mastery of intervals.

The children in Hattwick's study made decidedly lower initial scores, and showed decidedly less improvement through practice, than did the subjects in the studies by Jersild and Bienstock (14) and by Updegraff, Heiliger, and Learned (36). For example, the performance of four-year-olds in Hattwick's study was inferior to the performance of three-year-olds in the study by Jersild and Bienstock; further, whereas Hattwick found that only one out of every ten four-year-olds had sufficient *voco-motor* control to respond in the right direction in trying to reproduce simple intervals, Updegraff and her associates found that, of 1282 intervals sung by fourteen four-year-olds, only 7, or 0.5 percent, were in the wrong direction. The discrepancy appears to be due in part to differences in scoring standards and to a large extent also to differences in procedure.

Hattwick gave credit only if the child was correct in nine trials out of ten, while in the other two studies the child received credit if he was correct once or several times in a series of trials. Although a high standard of success no doubt is valuable for experimental purposes, the less rigid standard might

not only be justified but also distinctly advisable in tests designed for the practical purpose of probing children's potentialities.

The influence that differences in procedure might have on the results is emphasized by Updegraff. In her study, as in the Jersild and Bienstock study, the tones and intervals the child was asked to reproduce were presented directly by way of the human voice; in Hattwick's study, the experimenter gave a vocal demonstration and then presented the tones through the medium of a set of bells. In the course of her study, Updegraff tried the latter procedure and found that it produced many refusals in children who responded correctly when tested according to the former method.

With due reservations, by virtue of the subjective nature of the measurements that have been applied, and with due recognition of contrary findings, the available findings indicate that the more the testing procedures and the methods of training are adapted to the individual characteristics and needs of young children, the larger are the potential abilities that are revealed, the larger are the gains achieved through practice, and the more pronounced are the gains in interest and enjoyment that accompany improvement through practice.

Large individual differences in musical ability during preschool years have been found in investigations by Williams, Sievers, and others (9, 11, 39) as well as in the studies reviewed above. The findings also suggest, however, that a child's performance on a given test may give a very inadequate picture of his actual potentialities. In one study of the effects of training (14), it was found that some three-year-old children who at the start seemed able to sing only a small range of tones — two, three, or four — made striking gains during the course of practice. Even at the age of three or four years it appears that children may become habituated to using only a limited portion of their potential tonal range.

2. Studies of Rhythmic Response

Studies by Heinlein (10), Williams (39), Jersild and Bienstock (13), and Van Alstyne and Osborne (37) have dealt with the ability of young children to respond rhythmically. From the point of view of ability to keep exact time in walking, or with hand movements, to the accompaniment of the beats of the music or a rhythmic sound pattern, findings indicate that preschool children are considerably less accurate than are adults; measurements also show a steady increase with age in children's scores. At successive age levels from two to five years, children tested in one study (13) showed the following respective average

scores: 2 years, 41.8; 3 years, 56.3; 4 years, 82.3; 5 years, 97.5 — on the basis of a maximal possible score of 200. A limited number of adults earned an average score of 174. Children who have received exercise over a period of time in responding to a rhythmical pattern have not shown substantial gains in their ability to keep exact time (13, 37). It does not appear from the results that an average child at three years, for example, could be raised to the average performance of a four- or five-year-old child by virtue of special training, although more prolonged and varied practice might have shown more substantial results.

Apart from this, studies have indicated that children are not significantly more accurate in responding to music of a highly simplified character (provided by altering the roll of the mechanical piano in such a way that all perforations except those exactly in line with the beat of the music are eliminated) than in responding to the same composition in unaltered form. The tempo of the music has been found to make a difference on the scores. In one investigation (13) children made their lowest scores when keeping time to music played at the rate of 76 beats per minute, and their highest scores with music played at 186 beats per minute (which was the fastest tempo used). Children did substantially as well in responding to one meter as in responding to another. (Tests were made with compositions in 4/4, 2/4 and 3/4 time.) In a majority of comparisons, children scored higher in walking to music than in beating time with their hands, but the difference was not large.

3. Socio-Emotional Responses to Music

A study by Christianson (4) includes results obtained through application of a rating scale that was devised to measure socio-emotional responses to music, spontaneous dance patterns, use of rhythm in dramatic expression, and spontaneous comments and requests. On the composite scale there was an increase at yearly age levels from two to six years as follows: 2 years, 7.38; 3 years, 9.69; 4 years, 10.89; 5 years, 12.42; 6 years, 13.02. Children showed an increase with age in ability to synchronize their movements with the general rhythm of the music, if not with the precise beats. Through continued experience with music, children frequently invented dance patterns in which previous simple movements were spontaneously integrated into more complex movements. The use of markedly rhythmic music in connection with the children's nursery-school activities was found to help some shy children to become more expressive and to participate more freely in group activities.

An interesting incidental finding in this study was the fact that there was a rise with age from two to five in spontaneous requests and comments. At the primary and first-grade level, on the other hand, there was a drop in this form of spontaneity. Whether this drop in self-expressiveness is a function of the child's normal development or is due to increasing formality in the school situation as children grow older, the results do not indicate. Hattwick (8) similarly noted a decline with age in children's spontaneity in musical activities; he found that many children were reluctant to sing on request, especially after the age of eight years.

IV. STUDIES APPLYING PRIMARILY TO CHILDREN IN THE GRADES

The foregoing results are obviously limited, and even less adequate is the systematic information concerning the scaling of musical experiences in the elementary and later grades.

With the young, untutored child, simple, rhythmical tunes come readily to hand, but systematic evidence is not available as to how best the musical stimulus might be scaled from that point on.

1. Studies of Singing

As in the case of younger children, studies of children at the elementary-school level also indicate that conspicuously poor ability in singing may, in individual cases, be more a product of habit and lack of training than of lack of potential ability (15, 40). In a study by Wollner and Pyle (40), special training was provided for seven children who were notably deficient in pitch discrimination and in ability to sing, even though they had received musical instruction at school for several years. Some of the pupils made more progress than others, but all of them learned to discriminate a wide range of separate tones and intervals and they all made decided improvement in the ability to sing. These findings do not mean, of course, that similar training would render all children equal in musical ability.

Available findings have, in addition, indicated that educational manuals have sometimes underestimated the potentialities of children's voices during preschool years, especially in the singing of low tones, and the singing of a wide range of intervals, including chromatic intervals (9, 14, 36). In a study by Sherman (30) it was found that many children at the elementary- and high-school levels prefer lower tones. In Sherman's study, over 5000 children were asked to sing each of five

songs in three different keys. The medium key assignment was the one in which the song was published; the high and the low keys were established by transposing the song a minor third above and a minor third below the medium key. In choosing among the three keys, 39 percent of the boys voted for the low key, 39 percent for the medium key, and 22 percent for the high key. The corresponding vote of the girls was: low key, 31 percent; medium, 44 percent; high, 25 percent. In the case of both boys and girls, the *low* key received a higher vote than the high key at every age level from seven to seventeen years. The low key scored a vote of 28 percent or more at every age, in the case of the girls, and a vote of 34 percent or more at every age in the case of the boys. The low key received a higher vote than the medium key at five yearly levels in the case of the boys (at ages 7, 9, 14, 15, and 16) and at one level (age 7) in the case of the girls. Both sexes show a decline with age in the vote for the high key. This decline was quite regular in the case of the boys (from about 30 percent at seven years to less than 20 percent at sixteen years); in the case of the girls, the decline was irregular, but quite substantial (roughly, from 30 percent to 20 percent). The medium key (in which each song was published) was preferred by less than half at every age level.

The following summary shows the median number of tones or half tones sung by children at successive age levels from two to ten years in a study by Jersild and Bienstock (15). The tests administered were based on the tones represented in the C major scale. Each child's performance was scored according to the judgment of musically trained adults, and credit was given if, in the judgment of the scorers, the child successfully reproduced a given tone one or more times in a series of trials.

Age in years	2	3	4	5	6	7	8	9	10
Median number of tones sung	4	6	9	9	14	13.5	15	16	16

These scores obviously are limited in meaning, since they do not indicate how consistently or effectively a child could reproduce each tone in a series or in combination with other tones.

A second summary, based upon the same study, shows the individual tones sung by 50 percent or more of children from two to ten years, and by a limited number of adults. Middle C is italicized. Tones in parentheses were sung by 48 or 49 percent of the subjects. At the ten-year

level, scores are presented for both sexes combined, and (in lower case) for each sex, separately. The highest tone shown for men includes the falsetto.

<i>Age</i>	<i>Tones</i>
2 years	D E F G A
3 years	C D E F G (A)
4 years	B C D E F G A B C
5 years	A B C D E F G A B C D
6 years	A B C D E F G A B C D E F G
7 years	A B C D E F G A B C D E F (G)
8 years	G A B C D E F G A B C D E F G
9 years	F G A B C D E F G A B C D E F G
10 years	(F) G A B C D E F G A B C D E F G
Boys — 10 years	f g a b c d e f g a b c d e f g
Girls — 10 years	g a b c d e f g a b c d e f g a
Men	(D) E F G A B C D E F G A B C D E F G A B C
Women	C D E F G A B C D E F G A B C D E F G A

2. The Time to Learn Sight Reading or to Play a Musical Instrument

Quite problematical is the matter of when, how, and whether the child should be introduced to the various specialized, technical skills involved in music. The learning of 'sight reading,' for example, is not a performance that emerges naturally out of enjoyment of music in the manner, say, that many of the finer motor skills emerge from general motor coördination. It is true that if a child already has a strong zest for music he will approach the business of sight reading with a strong motive to learn. Some children will on their own accord try to master the intricacies of notation; such children, however, are the exception rather than the rule.

Concerning the age at which the average child is 'ready' to learn sight reading or to play a standard musical instrument, there is little systematic knowledge. A child's readiness will be influenced, of course, by his native abilities and his musical background. In musical ability, as in other things, there are large individual differences. However, until evidence is produced to the contrary, there is no reason, from a practical point of view, either to regard these differences as more outstanding or to regard them as more of a bar to a systematically for-

mulated program in the field of music education than in any other branch of education.¹

3. The Kwalwasser-Ruch Test and the Course of Study

Kwalwasser's (17) findings concerning children's mastery of musical concepts and skills at various grade levels are revealing when considered in the light of proposed courses of study. The Kwalwasser-Ruch test of musical accomplishment (20) incorporated much of the material called for by a course of study adopted in 1921 by the Music Supervisors National Conference (23). The tests were administered to 4,177 children "representing five different school systems nationally prominent for their superior work in music." The test results indicated that the standards described by the music supervisors' council as easily attainable and representing desirable ideals for all schools were, in Kwalwasser's words, "so ambitious as to be beyond the reach of the children in the school systems measured" (17, p. 107).

Among the attainments recommended for the *third grade*, for example, in the course of study referred to, was the ability by the end of the year to sing at sight, by syllables, easy melodies in any of the usual nine keys. A knowledge of key-signatures, among other things, is necessary for the acquisition of sight-reading ability. One of the tests in the Kwalwasser-Ruch battery included fifteen items designed to measure knowledge of key-signatures. The results indicated that not one of the fifteen items was correctly recognized by as many as 50 percent of the children in the *fourth* and *fifth* grades; the key of C major was the only key signature correctly recognized by as many as 50 percent of the children in the *sixth* and *seventh* grades. Not a single minor key signature was recognized by as many as 50 percent of the children in *any* of the grades.

Other parts of the Kwalwasser-Ruch battery covered such matters as knowledge of musical symbols and terms, time signatures, rest values, and note values; recognition of familiar melodies from notation; recognition of pitch names; detection of pitch errors, and the like. Results are shown in terms of grade levels. The trends of the scores in the individual tests are very irregular, exhibiting many plateaux and occasional dips, but in the aggregate there is an increase from grade to grade. Following are the average aggregate scores at successive grade levels (based upon ten tests, yielding a maximal obtainable score of

¹ For a review of pertinent data and a discussion of this matter, see Mursell (21).

240) : Grade IV, 70; V, 78; VI, 102; VII, 118; VIII, 132; High School, 171. Among the points emphasized by Kwalwasser in his conclusions are the following: (1) The acquisition of musical knowledge by children in public schools is unsteady and irregular. (2) The skill of reading from notation is not acquired by grade-school children to any considerable extent. (3) Girls are more than a grade in advance of boys in musical accomplishment throughout the entire range of grades. (4) The learning rate in the areas covered by the tests is twice as great in Grades I to IV as in Grades IV to XII. (5) Present teaching methods¹ are not sufficiently refined to insure many of the aims formulated by the National Research Council of the Music Supervisors National Conference.

It can be seen that the foregoing statements, while showing a decided discrepancy between the standards of a recommended course of study and the actual achievement of children, do not indicate what children at various developmental levels might accomplish under optimal methods of instruction. Earhart and Gatto (6) used equivalent groups of children in the third, fourth, fifth, and sixth grades in a study of the effectiveness of a general course consisting only of vocal music as compared with a course that combined vocal and instrumental activities. The instruments that were employed consisted mainly of the percussion type. The experiment was carried on for a period of three months; tests of musical knowledge and accomplishment were administered at the beginning and at the end of the experiment. The results indicated that the procedure of combining vocal and instrumental work produced larger gains than did vocal work alone in Grades III and IV, while the latter procedure produced larger gains in Grades V and VI; in none of the groups, however, as the investigators point out, was the difference a reliable one.

4. The Teaching of Instrumental Music

Authoritative research findings would be highly useful in connection with problems such as: (1) the approximate stage of maturity at which it would be most feasible to introduce piano lessons and training on various string, wind, and percussion instruments; (2) methods of teaching, if any, that may best be suited to one developmental level as compared with another; (3) the effect, from the point of view of eventual skill or appreciation, of the practice of having children construct in-

¹ The date of this study is 1927.

struments of their own and experiment with tone production by means of containers of water, percussion bands, and so forth; (4) the value of gadgets that have been used to simplify the approach to the piano and other instruments; and (5) the possible procedures that might be employed for providing a more satisfactorily graded approach to the standard instruments, which usually are rather formidable to the beginner.

Large individual variations apparently exist between different schools in connection with the teaching of instrumental music. A recent survey by Cheyette (3) includes reports from 44 schools, including several of the larger city public-school systems in the country, as well as several small-city and rural-school systems, and a few private schools. The results show that the schools place strong emphasis on the formal mastery of the printed score. Music-reading from the printed score, according to the reports, was introduced in the second grade in over half the school systems, in the third grade in 20 percent, in the fourth grade in 11 percent. Practically all the schools offered instrumental instruction in the elementary school, beginning in most instances in the fourth grade. Over half the schools offered class piano instruction in the elementary school, a few as low as the first grade. There was a decidedly large range (from 1 to 100 percent), however, in the proportion of the pupil population participating in instrumental music. Urban communities offered a larger program than did rural communities; the pupil participation was largest in small city schools and in private schools.

On the basis of experiments and observations associated with practical work in music with children, Pierce (24) has reported many pertinent findings, some of which are tentative. In the process of trying various methods of teaching the reading of music, Pierce has found that the traditional drill exercises in the teaching of 'sight reading' are not well suited to elementary-school children. She has also noted, among other things, that a child is not likely to 'read' music effectively until he has mastered an instrument. In connection with training in instrumental music, Pierce found in one experiment that some second-grade children who received class instruction in piano made greater progress than did some of the groups of more advanced years, although her data are insufficient to support a recommendation that piano instruction should be placed at this level generally. She also has found that some selected children at the third-grade level have been able to make significant progress in mastering the trumpet, clarinet, and violin, and

have surpassed many older pupils. Again, in connection with this observation the data are too limited to yield general recommendations.

The problem as to the developmental level at which various musical skills might best be taught is decidedly complicated by the fact that a child's readiness is influenced not simply by his mental age and physical maturity but also to an important degree by such factors as his musical background, past experiences — including the kind of training he has had, the attitudes he has formed — and the special aptitudes he may possess.

The suitability of certain instruments at various developmental levels may, to some extent, be inferred on *a priori* grounds from general facts regarding the child's development. Thus Pitts (25) points out that the physical properties of the piano conform more to the physical and mental characteristics of children than do the properties of several other instruments — the child can sit at the piano; the keyboard makes a clear pattern to the eye and provides a definite key for each pitch; it requires fewer delicate muscular adjustments, and it makes fewer demands for fine adjustments between ear, memory, eye, and motor control than do most of the reed and string instruments. On the same premises, Pitts reports that the flute, the double reeds, and several of the brasses are likely to be better suited to children of high-school age than to those of elementary-school age. There is need for further research in these matters. Both Pierce and Pitts emphasize the point that one of the most important considerations in connection with any specific recommendation is the child's musical background and experience and his feeling for music.

In a study by Colby (5), children aged three and a half years to four and a half years received instruction in playing a tin fife. All the children made some progress in manipulating this instrument. By the end of the third lesson, they could all blow the same open tone or pitch (C, 256), and by the fifth day, all were able to produce a second pitch by covering the first of the six holes in the instrument with the first finger. By the end of the first month, all but two could produce most of the melodic patterns within the restricted compass of the major third. During the next few weeks, however, few of the children made substantial progress. Among factors that interfered with progress was the difficulty that children with short fingers had in trying to cover successfully more than three holes at once.

With some children, "the span of melodic perception or the limit of auditory-manual coördination seemed to have been reached for their

particular maturation level." But one outstanding child, at the end of the semester, had mastered a repertory of several tunes, including "Yankee Doodle," and "Lightly Row" (first phrase). The author concludes, however, that specialized instrumental training at the preschool age "costs far more patience than it is worth," that the same amount of effort applied to vocal acquisitions of folk-songs and other melodies would yield higher returns, yet that a "minimal amount of auditory-manual training" under appropriate conditions may foster an interest in instrumental music and probably deepen its esthetic value later on.

V. SUMMARY

In conclusion, it may be pointed out that the studies that have been made touch only upon limited aspects of the broad field of music education. Many of the studies are sketchy; others will strike the musician as being very superficial. In the literature on music education one finds, on the one hand, a monumental accumulation of writings of a general and sometimes of a rather inspirational character; on the other hand, one finds specialized tests and inquiries dealing with some of the elements of musical ability and psychological aspects of music. Very rare are the studies that apply systematic research methods in connection with a practical and practicable educational project. The studies at the preschool level, although limited and sketchy, show a promising trend. These studies have shown that it is possible to apply tests and to administer training in a functional manner; they have revealed potentialities that have not customarily been taken into account in educational manuals; they have indicated that it is possible to give systematic training and opportunities calculated to increase a child's competence in music, that it is possible to obtain systematic measurements of the effects of such training on ability and interest, and, what is very important, that under proper auspices the gains that are made in the child's ability are not obtained at the cost of coercion and loss of interest, but are paralleled by increased interest and enthusiasm. Similar research, enlarged in scope, and extended systematically into later developmental levels, might show the way by which human beings, through education, could probably capitalize more fully upon the tremendous and often unused resources for enjoyment that music affords.

BIBLIOGRAPHY

- (1) BIENSTOCK, S. F. "Report of national survey of experimental projects in music education." Pp. 227-283. (In *Music Educators National Conference Yearbook*. Chicago, 1936)
- (2) BIENSTOCK, S. F.; FLAGG, M.; and McDAVID, N. "Bibliography in the field of music education." Pp. 284-288. (In *Music Educators National Conference Yearbook*. Chicago, 1936)
- (3) CHEYETTE, I. *Teaching Instrumental Music in Public Schools*. (Ed. D. Report. New York: Teachers College, Columbia University, 1937. Ms. 70 pp.)
- (4) CHRISTIANSON, H. *Bodily Rhythmic Movements of Children in Relation to Rhythm in Music*. (Ph.D. Report. New York: Teachers College, Columbia University, 1938. Unpublished)
- (5) COLBY, M. G. "Instrumental Reproduction of Melody by Preschool Children." *Jour. of Genet. Psych.*, 47: 1935, pp. 413-429.
- (6) EARHART, W., and GATTO, F. M. "The value of instrumental training in public school music: an experimental study." *Pittsburgh School*, 9: 1935, 176-196.
- (7) FLEMMING, C. W.; FLAGG, M., et al. *A Descriptive Bibliography of Prognostic and Achievement Tests in Music*. (New York: Horace Mann, Teachers College, Columbia University, 1936. 20 pp.)
- (8) HATTWICK, M. S. "A genetic study of differential pitch sensitivity." Pp. 1-68. (In Hattwick, M. S., and Williams, H. M. *The Measurement of Musical Development, II*. Iowa City: University of Iowa Studies in Child Welfare. 1935. Vol. II, No. 2.)
- (9) HATTWICK, M. S. "The rôle of pitch level and pitch range in the singing of preschool, first grade, and second grade children." *Child Development*, 4: 1933, 281-291.
- (10) HEINLEIN, C. P. "A new method of studying the rhythmic responses of children, together with age evaluation of the method of simple observation." *Jour. Genet. Psych.*, 36: 1929, 205-228.
- (11) HISSEM, I. "A new approach to music for young children." *Child Development*, 4: 1933, 308-317.
- (12) JERSILD, A. T. *Training and Growth in the Development of Children*. (New York: Teachers College, Columbia University, Child Development Monographs No. 10, 1932. 73 pp.)
- (13) JERSILD, A. T., and BIENSTOCK, S. F. *Development of Rhythm in Young Children*. (New York: Teachers College, Columbia University, Child Development Monographs No. 22, 1935. 97 pp.)
- (14) JERSILD, A. T., and BIENSTOCK, S. F. "The influence of training on the vocal ability of three-year-old children." *Child Development*, 4: December, 1931, 272-291.
- (15) JERSILD, A. T., and BIENSTOCK, S. F. "A study of the development of children's ability to sing." *Jour. Educ. Psych.*, 25: October, 1934, 481-503.
- (16) KWALWASSER, J. "Musical curriculum investigations." *Rev. Educ. Research*, 7: 1937, 130-131.
- (17) KWALWASSER, J. *Problems in Public School Music*. (New York: M. Witmark & Sons, 1932. 159 pp.)

- (18) KWALWASSER, J. *Tests and Measurements in Music*. (New York: Birchard, 1927. 146 pp.)
- (19) KWALWASSER, J., and DYKEMA, P. W. *The Kwalwasser-Dykema Music Tests for the Schoolroom, the Studio, the Home*. (New York: Carl Fischer, 1930. Five double-faced records)
- (20) KWALWASSER, J., and RUCH, G. M. *Kwalwasser-Ruch Test of Musical Accomplishment*. (Iowa City: Bureau of Educ. Research and Service, University of Iowa, 1924)
- (21) MURSELL, J. *The Psychology of Music*. (New York: W. W. Norton & Co., Inc., 1937. 389 pp.)
- (22) MUSIC EDUCATION. *Thirty-Fifth Yearbook* of this Society, Part II, 1936. 256 pp.
- (23) Music Supervisors National Conference. (Chapel Hill: Bulletin No. 2. Music Supervisors Journal, 1922. 11 pp.)
- (24) PIERCE, A. F. (Privately communicated report of work in progress at the State University of Iowa, Iowa City, 1937)
- (25) PITTS, L. B. (Unpublished observations. Cleveland Junior High School, Elizabeth, N. J.)
- (26) SEASHORE, C. E. "The discovery and guidance of musical talent." (In the *Thirty-Fourth Yearbook* of this Society, 1935, 447-461)
- (27) SEASHORE, C. E. *The Psychology of Musical Talent*. (New York: Silver Burdett Co., 1919. 288 pp.)
- (28) SEASHORE, C. E. *The Present Status of Research in the Psychology of Music at the University of Iowa*. (Iowa City: University of Iowa Studies, Fifth Series, Vol. 2, No. 4, 1928)
- (29) SEASHORE, C. E. (ed.) *The Vibrato*. (Iowa City: University of Iowa Studies in Psychology of Music, Vol. I, 1932. 382 pp.)
- (30) SHERMAN, A. H. *A Study of the Pitch Preferences of Children*. (Syracuse, 1935. Unpublished master's thesis)
- (31) STANTON, H. M. *Measurement of Musical Talent: the Eastman Experiment*. (Iowa City: University of Iowa Studies in Psychology of Music, Vol. 2, 1935. 138 pp.)
- (32) STANTON, H. M. "Measuring musical talent: Seashore tests as administrative aids." *The Personnel Jour.*, 7: December, 1928, 286-292.
- (33) STANTON, H. M., and KOERTH, W. *Musical Capacity Measures of Children Repeated After Musical Training*. (Iowa City: University of Iowa Studies in Aims and Progress of Research, No. 42, 1933, 5-48)
- (34) STANTON, H. M. *Prognosis of Musical Achievement*. (Rochester. Studies in Psychology, Eastman School of Music, University of Rochester, Vol. 1: No. 4, 1929, 3-89)
- (35) STANTON, H. M. "Seashore measures of musical talent." *Psychol. Monog.*, 39: No. 2: 1928, 135-144.
- (36) UPDEGRAFF, R.; HEILIGER, L.; and LEARNED, J. "The effect of training upon the singing ability and musical interest of three-, four- and five-year-old children." (In R. Updegraff, et al. *Studies in Preschool Education*, I. Iowa City: University of Iowa Studies in Child Welfare, New Series No. 346, Vol. 14, 85-131)
- (37) VAN ALSTYNE, D., and OSBORNE, E. *Rhythmic Response of Negro and White*

Children Two to Six. (Washington, D. C.: Soc. for Research in Child Development, 2-4, Serial No. 11, 1937. 63 pp.)

(38) WILLIAMS, H. M. "Immediate and delayed memory of preschool children for pitch in tonal sequences." (In Hattwick, M. S., and Williams, H. M. *The Measurement of Musical Development, II.* Iowa City: University of Iowa Studies in Child Welfare, 11: No. 2, 1935, 85-94)

(39) WILLIAMS, H. M.; SIEVERS, C. H.; and HATTWICK, M. S. *The Measurement of Musical Development* (Iowa City: University of Iowa Studies in Child Welfare, 7: No. 1, 1932)

(40) WOLNER, M., and PYLE, W. H. "An experiment in individual training of pitch-deficient children." *Jour. Educ. Psych.*, 24: 1933, 602-608.

CHAPTER VII

RADIO AND MOTION PICTURES

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The discussion that follows deals with the radio and motion pictures both from the classroom and from the out-of-school angles. In most cases, children devote considerably more time to radio programs at home, and to motion pictures exhibited in commercial theaters, than to programs or films introduced into the classroom.

I. RADIO PROGRAMS

1. Radio Listening at Home

As of January 1, 1937, the Joint Committee on Radio Research estimates that 90 percent of homes in cities with a population of 2500 or more are equipped with radios and that the percentage for the country as a whole is 78 (4). Studies of children of elementary-school age in large cities amply confirm this: well over 90 percent report that they have radios at home, and many of the remaining children have access to the radios of neighbors and friends (3, 7, 15, 34).

The average child will devote several hours a week to the radio, although the amount may vary in different localities; there will be differences also between children belonging to different schools and socio-economic levels (1, 15) and also according to changes in the seasons. In one large private school in New York City, for example, children were found to devote only about half as much time to the radio as the average public-school child in the same city (15); it was also found that children spent decidedly less time in listening in summer than in winter (15).

Listening to the radio at home is one of the main leisure-time activities of the average present-day child. By virtue of this fact, if for no other reason, radio programs impose a practical responsibility on all parents and teachers. While the quality of what is broadcast to children rests primarily upon the decisions of the broadcasters them-

selves, their decisions can be influenced effectively through the approval or disapproval of parents and other adults. In addition, many specific problems in connection with the use and effects of radio programs arise in individual homes. Available research throws light on some of these problems, but not upon all.

Any practical steps in connection with radio programs must obviously take some account of children's interests. In studies of these interests, some variations have been found according to the locale of the study (partly by reason of differences in the particular programs that happen to be available), but certain outstanding trends are none the less apparent. The data do not show conclusively to what extent children's radio interests are wholly spontaneous, to what extent influenced by the radio fare with which they have been fed, to what extent by the tastes of adults, and to what extent they might be modified if conditions were decidedly changed. (It may be said, however, that many attempts to go counter to the trend of apparent interests have been unsuccessful, although the competition of established programs may account in part for this.)

Surveys of children's preferences among radio programs have shown considerable agreement on certain general trends (3, 7, 15, 21). The following summarizes some of the results obtained in a series of seasonal surveys involving several thousand children in New York City and its environs (15). The programs to which large numbers of children were found to listen at all age levels included not only many adult programs but also many that were especially designed to appeal to children. Of the twenty programs that children reported they listened to most often during three successive surveys in 1935 and 1936, from eight to ten were adult, rather than children's, programs. Many of these adult programs were named by large numbers of children at each age level from six years and on, and many of them likewise were named when children reported the three programs that they "liked best." Distinct age trends appeared in comparisons between children ranging from six to fourteen years, but quite as outstanding was the fact that some popular programs stood high in favor at all age levels. Programs that have been found to rank near the top at every successive age level have included certain children's programs with a large element of adventure and crime, as well as certain adult comedians. Several of the programs that thus cut across age boundaries are likewise likely to rank near the top both with boys and with girls, and to rank high with children of both low and high intelligence and low and high socio-economic status.

In one survey, one popular program was listened to more or less regularly by 70 percent of the population in the study, according to the children's own reports.

Among programs that show distinct age trends, the following types may be noted (although all of these programs are likely to have some followers at all age levels, and the trend will vary somewhat with the individual program): programs with a frank element of phantasy and make-believe begin to show a distinct decline in favor at about the age of nine; programs containing nursery rhymes, or adaptations (with narrative accompaniments) of folk tunes and musical classics, and programs directing chatter and stories specifically to younger children likewise begin to decline in favor at the age of eight or nine years; comedians of the more subtle variety (as distinguished from those who make "funny" noises or those who exchange broad insults with comic stooges), as well as drama of the homely or authentic or more serious sorts, news commentators and news broadcasts, tend to increase in popularity after the age of nine.

In general, boys show a somewhat higher preference than do girls for programs involving violence and crime (although some crime and robust adventure serials stand as high with girls as with boys); girls show a higher preference than boys for programs involving movie stars, crooners, programs dealing with drama of a homely sort, and programs in which girl or child actors play a prominent rôle. In general, the number of girls who listen to a program that appeals especially to boys is likely to be larger than the number of boys who listen to a program with special appeal to girls. Both boys and girls, but especially boys, are likely to show a decided preference for programs involving older (rather than younger) child characters, and to prefer a majority of adults in the cast of characters. A program that deals realistically with the daily activities, characteristics, and foibles of genuine children is likely to have more appeal to young children than to children above the second or third grade, and to have less appeal to children than to adults.

When children report the programs they listen to, there appears (15) a steady increase from year to year in the number of programs that the average child is able, offhand, to identify. This is, of course, primarily an indication of age differences in unprompted recall rather than an indication of differences in amount of time actually spent at the radio.

When they first begin to listen regularly at the age of five or six years (sometimes four, sometimes after six), some children appear to

regard the action and the characters as real (2, 17). This does not appear to be a universal phenomenon, however, and this aspect of radio listening, as well as the process by which children learn to distinguish the fictional from the real, is in need of further study. In general, a child who, at about six, inclines to believe that the action and characters in dramatic programs are real, may have overcome this belief a year or two later, as far as the general run of programs is concerned, but still for some time thereafter may regard the material in one or two programs as real.

The effect of radio programs on children's emotions — especially on their fears — as related to age or maturity levels has been the subject of some study, but the data secured are not so detailed or systematic as they should be. Such matters as signs of anxiety while listening, evidences of trepidation and fear after an exciting broadcast is over, and reports of imagery from radio programs in bad dreams and nightmares have been observed in individual children at all age levels from kindergarten to the high school (10, 14, 17). While it appears to be true that radio programs contribute only a small portion of the fear stimulation that is brought to bear upon children in their daily environment, this circumstance obviously does not condone the practice of preying upon children's fears by way of the radio. Some children who exhibit fears and nightmares that apparently have been precipitated by a radio program also exhibit emotional tensions and anxieties apart from the radio; and in many cases, undoubtedly, the radio is an incidental rather than a primary cause of the child's distress (14, 17). In a study by Foster and Anderson of children's unpleasant dreams (10), mothers reported radio programs as the cause of bad dreams in 19 out of 210 instances in which causes were assigned. Many children will seek out programs that arouse fear. Some children appear to become hardened and immune, as they grow older, to the stock devices for injecting excitement and suspense into a program (17), but this process of increasing immunity has not been studied systematically. Evidence of an informal nature suggests that although this form of imperviousness may be related to age and experience, it will also vary decidedly with different children regardless of age.

Evidence regarding the incidental learning that takes place when a child listens to the radio is very limited. Even when the child listens only for the fun of it, some incidental learning may take place, such as the learning of new words, an increased incentive to study a subject that has been touched upon (such as geography or astronomy), and accel-

erated learning of how to tell the time by the clock in order to tune in on a favorite program at the right time (7). In the average case it appears, however, that these and other incidental learnings are not outstanding in connection with programs that are built simply upon a policy of taking advantage of a child's desire for excitement. There is need for further study of the effects of entertainment programs on children's information, concepts, and attitudes.

Although further study is needed to show ways in which radio programs can deal constructively with children's interests, available evidence supplies an answer to some of the major problems that radio programs present in many homes, and the exercise of ordinary decency and a moderate amount of common sense in the preparation of children's programs can go far toward solving the problems. On the one hand, the results of surveys of children's radio preferences (15, 16) indicate first, that programs can be so constructed that they meet a child's interest in vicarious excitement and adventure without undertaking, in a flagrant manner, to prey upon his emotional susceptibilities and to arouse his fears; and second, that it is possible to scale a program to a child's understanding and tastes without taking advantage of his ignorance by plying him with half-truths, distortions, and humbug.

In relatively well-educated circles there often is a decided discrepancy between the programs children want to hear and the programs parents want them to hear (3, 18); this state of affairs also prevails in some homes of average or below average educational status, though not to the same degree (7). Obviously, the presence of a marked discrepancy between what children want in the way of radio programs and what parents think they should have raises many questions. It would be decidedly helpful if more systematic evidence were available in connection with many such questions, including the following: When children, almost unanimously, exhibit interests of a kind that many parents deplore, to what extent do these interests represent 'natural' or wholesome inclinations? To what extent have they been fostered artificially by the kind of radio fare on which children have been fed, particularly by way of programs built on a formula of violence, crime, and appeals to fear? When parents object to a program that children like, and do so on the ground that the program is 'trashy,' or 'stupid,' or in 'bad taste,' to what extent are the parents governed by the interests and tastes of educated adults rather than by consideration for the interests and needs of children?

Available data do not give an authoritative answer to the question

as to how much time children at various age levels should spend at the radio. Since there are radios in nearly every home, since broadcasts run throughout the day, and since children listen to adult as well as juvenile programs, the problem of budgeting the child's time must necessarily be solved on the basis of the parents' best judgment. There is some evidence that the radio is less likely to interfere with homework, reading, and other productive activities in the case of bright children, and in the case of children who are enthusiastic about their school work, than in the case of less fortunately situated children.

There is lack also of systematic evidence regarding methods that might be employed to cultivate a child's critical faculties, and to improve upon the quality of his interests and tastes. Elimination, from the broadcasting end, of programs of a patently trashy sort would obviously be helpful. From the home and school angle, it often has been observed that the example or enthusiasm of adults may have a salutary effect on a child's choices (although negative reactions to such influences may also occur). A policy of belittling a program, picking it apart, and helping the child to see its obvious absurdities may work with a suggestible or a compliant child, but even bright children aged eight to ten years have been observed to remain loyal to a program after they themselves have learned to notice some of its patent shortcomings and have openly commented upon them. Studies of an informal character with fifth- and sixth-grade children indicate that many positive results may come through a policy of classroom discussion and evaluation of the programs pupils hear at home. Children may be led to discern and to acquire an interest in previously unnoticed qualities in certain programs, and to acquire an interest in programs that happen to correlate with study projects in school (26, 30). From the writer's observations, it appears that such projects are more likely to succeed in stimulating positive interests in certain programs or types of programs than in building up negative or critical attitudes, of a generalized nature, toward mediocre programs that happen already to be favorites with the children.

2. Radio in the Classroom

The use of the radio in the classroom has far out-stripped efforts to measure and define the effects of its use. Two large-scale and much-needed investigations of the peculiar, as well as general, values of radio as an educational instrument are now under way (8, 29). In addition, there have been many surveys more limited in scope. Tyler (32,

33), in a review of research, has pointed out the dearth of data concerning the radio's effectiveness in accomplishing educational purposes. Numerous studies have demonstrated that children can learn many things from radio broadcasts, including various types of information, certain skills (as in music and pronunciation of a foreign language), and increased appreciation and interest in certain fields (as in science, literature, and music) (9, 11, 13, 19, 20, 22, 23, 28, 31, 37). Tyler points out that there is need for further evidence along these lines, especially in connection with outcomes that may be classified as 'appreciations,' as well as in connection with outcomes in terms of effects on techniques of thinking, sensitivity to social problems, ability to generalize on the basis of adequate data, and so forth.

Notably lacking are systematic researches concerning the unique values and limitations of radio broadcasts of various kinds as related to age or maturity levels.¹ Many of the peculiar values that the radio can supply — such as bringing 'live' news, and personalities, and issues into the classroom and making available to large numbers the offerings of rare or outstanding artists, writers, performers, teachers, and authorities — obviously apply more or less to children of all ages. To the extent that broadcasts parallel the normal course of study, some pertinent information as to content and projects best suited for various maturity levels might be carried over from other chapters in this Yearbook. However, the question would arise as to the extent and ways in which general recommendations, arrived at apart from the use of the radio, might have to be modified by virtue of the peculiar advantages and limitations of radio broadcasts. From the point of view of adapting radio instruction to various maturity levels, it would be helpful if more evidence were available on many points, such as: the objectives and purposes, the types of material or subject matter, and the forms and techniques of presentation that are especially suited or

¹ Practical suggestions designed to aid teachers in devising criteria for selecting broadcasts to fit the curriculum and for evaluating broadcasts are offered from time to time in the monthly numbers of the *Ohio Radio Announcer* (35). Among the handbooks for teachers are volumes by Darrow (6) and by Harrison (12). The annual bulletin of the American School of the Air (5) lists many programs according to the grade levels to which they are deemed appropriate. Reports covering a wide range of topics, including discussions of policies, techniques, problems, and efforts to measure and evaluate appear in the annual issues of *Education on the Air* (24) and in *Educational Broadcasting* (25), and in numerous publications of the National Advisory Council on Radio in Education, New York City, under the editorship of Tyson (36).

unsuited to one developmental level as compared with others; and modifications (if any) of the curriculum at various levels that might profitably be made by virtue of the resources that the radio supplies. Along what lines, if any, might certain projects or areas of subject matter, now normally introduced at a given stage of the child's school career, be omitted, or placed earlier or later, to accommodate projects that the radio is peculiarly able to provide? In connection with what projects, if any, might a broadcast profitably be addressed to a wide age or grade range, and in what activities might it better be directed to a narrower grade or mental-age range? The answers to such questions obviously will be influenced, in the specific situation, by the quality of the broadcast, as well as many other factors, including the radio personality and skill of the instructor or artist, regardless of the topic that is being discussed (27).

II. MOTION PICTURES¹

As in the treatment of radio programs, the subject of motion pictures will be considered from the angle of out-of-school contacts (commercial pictures) and from the angle of the use of the cinema in the classroom (educational pictures).

1. Commercial Motion Pictures

Children's experience with motion pictures begins in most cases by the time the child reaches school age, sometimes earlier, and continues throughout life. By virtue of differences among localities and occupational groups, precise figures regarding attendance at motion pictures as related to age, and applying to the general population, cannot be given (12, 19, 38, 39, 48, 55).² Attendance figures reported by Dale, based upon studies at Columbus, Ohio (12), indicate that approximately 36.7 percent of 'movie-goers' are minors; about 3 percent of all admissions in this survey represented children below 7 years; 12 percent were children aged 7 to 13 years; and 22 percent were children aged 14 to 21 years. According to the same set of figures, children aged

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² Reference numbers in parentheses in this second portion of the chapter refer to the second portion of the bibliography, that on motion pictures.—*Editor.*

5 to 8 years attended the movies about .42 times per week, on the average, but about 22 percent never attended; from 8 to 19 the average attendance was about one picture a week, and only 5 percent never attended. In the age range from 8 to 19 years, over 20 percent of the children were found to attend twice or more each week. Boys were found to attend more frequently than girls, and children in urban areas more frequently than those in rural areas. About two-thirds of the attendance in the age range from 7 to 20 occurred during week-ends, on Fridays, Saturdays, and Sundays.

Motion pictures are an integral part of the child's world, and as such present a practical problem from an educational point of view. As in the case of radio programs, responsibility for the character of the films children see rests to some extent upon parents — both directly, through control of the child's attendance, and indirectly, through potential control of the kinds of pictures that are released from the studios. Much information pertinent to this practical problem is available, although in many respects it is not so systematic as could be wished, and much of it gives more emphasis to possible negative effects than to positive values that might be promoted.

Children's interests in the pictures roughly parallel their reading interests (14, 38, 41, 47, 54, 58), with the exception that 'comedy' figures more prominently in the cinema than in reading. Younger boys like adventure stories, Western thrillers, and comedies; younger girls also like adventure, comedies, and Western thrillers, but girls exhibit an interest in romance at a somewhat earlier age than boys. Interest in adventure and comedy continues into adolescence, but at this period romance gains increasing appeal. Actually, the results of surveys of children's interests in motion pictures at any given time must be taken with some reservation. The titles named by children will be decidedly influenced, naturally, by the pictures that have been available for them to see. Accordingly, if children in a given community give a high vote to 'wild Westerns,' mystery, and crime 'thrillers,' and picturizations of the general run of 'pulp' magazine stories, such a vote may not give a true indication of what the choices might be if the children had had more experience with productions of a more artistic or authentic character.

As is the case with radio programs, a large proportion of the pictures children see are not specifically designed for children. Again, as is the situation in the radio field, many of the pictures do not receive a high rating from adult critics. Findings reported by Holy (38) illustrate

this point. Motion pictures seen by children in an Ohio city over a period of time were rated by a reviewing committee. Of those seen by pupils in Grades VII to XII, 29 percent were classified as being of good quality, 41 percent of average quality, and 30 percent of poor quality. We do not know to what extent the judgments of local reviewing bodies are based upon the tastes of educated adults rather than upon the needs and interests of children. Even without such evidence, however, there are broad lines of demarcation between films that are patently trashy and cheap and films that contain some genuine dramatic and artistic qualities. Actually, the findings in surveys of children's interests indicate that children themselves would look with favor upon a larger proportion of motion pictures of the latter category. In a study by Dale (11), involving returns from approximately 22,000 children from the fourth grade through high school, children were asked to name the books or stories they would like to see in motion pictures. The books that received twenty-five votes or more were evaluated in terms of graded book lists for children (60). An overwhelming proportion of the votes were cast for books that have been rated as acceptable by parents, teachers, and librarians, as distinguished from books that most teachers and librarians would rate as trash.

Research shows that children, even the younger ones, receive a large number of impressions from the cinema and that these impressions are remembered over a long period of time. In a study by Holaday and Stoddard (37), in the Payne Fund series of investigations (6), the amount recalled by adults after seeing a picture was used as a standard in measuring the amount retained by children. Eight- and nine-year-old children were found to remember 60 percent as much as did adults; thereafter the percentage increased (at 11 and 12 years, for example, the amount remembered was 75 percent; and at 15 and 16, 91 percent). Retention of what was seen also was high over a rather long period of time (37, 51). It was found, for example, that second- and third-grade children, after six weeks, retained 90 percent of what they could recall the day following the show. The amount recalled varied according to the topics treated, but the data show strongly that young children can obtain much information from a motion picture, even though they make no deliberate effort to memorize. It was also found that they may accept as valid a good deal of misinformation.

Another systematic study deals with the effects of motion pictures on children's attitudes. Peterson and Thurstone (50) applied 'before and after' measurements of the attitudes of children (of junior- and

senior-high-school age) in connection with such topics as gambling, war, prohibition, and different races and nationalities. Definite shifts in attitude were observed on many points after the children had seen a picture that portrayed one of these topics in a favorable or unfavorable light. It was found, for example, that children had a less favorable attitude toward Negroes after having seen "The Birth of a Nation."¹

The emotional effects of a motion picture — as revealed by changes of bodily resistance to an electric current and by pulse records — have been studied by Dysinger and Ruckmick (21). Conflict, danger, and various other forms of pseudo-tragedy produced the most intense reactions under the age of 12 years; these reactions were less pronounced from 12 to 16 years, and considerably reduced after the age of 19. Erotic scenes produced little response, in most children, at the age of 9 years; some responded at 10; others at 11 and 12. The results show a definite increase in response to erotic scenes during puberty, the greatest response to scenes of love and sex appearing at about 16 years. The results revealed large individual differences. They emphasize the point that children's reactions tend to occur in response to specific things — to episodes rather than to the picture as a whole. The authors make the significant comment that young children, and even adolescents, may fail to make the same synthesis of a motion picture that the adult does, with the incidental result, among other things, that a concrete and exciting scene portraying robbery, murder, or other forms of violence, or love, may not be counteracted by an abstract moral ending.

The fact that the pictures often frighten children and influence their subsequent fears and nightmares has been observed in many studies dealing with children from the age of five to past adolescence. The extent of this influence, compared with other conditions that affect children's fears, has not been probed in detail. When asked specifically whether they have ever been frightened by a motion picture, over 93 percent of a group of 237 fourth- to seventh-grade pupils studied by Dysinger and Ruckmick (21) answered, "Yes." When asked simply to tell about their fears, with no leading question as to the pictures or to any other topic, there was specific reference to the cinema in the fears first mentioned by 32 of 398 five- to twelve-year-old children in a study

¹ This study showed that *a priori* judgment as to the probable effect of a given film may not be verified by actual tests. One film, for example, that made the children more, rather than less, severe in their judgment of gambling gave a relatively favorable portrayal of a gambler, though not of his crimes.

by Jersild, *et al.* (40). These references were scattered throughout the age range.

In a study by Foster and Anderson (22) of bad dreams in children aged 1 to 12 years, as recorded by the children's parents, motion pictures were mentioned 18 times in a total of 210 reports of reasons or causes apparently underlying bad dreams. As can be seen, the pictures were mentioned in only about 12 percent of the replies in the two latter studies, in which no leading questions as to the effects of the pictures were asked, as compared with over 90 percent affirmative replies when children were questioned specifically about the pictures, as in the first-named study. Those results need not, however, be regarded as inconsistent. The lower value, 12 percent, doubtless indicates that the pictures are only one of many influences that affect children's fears in ways that a child cannot recall when questioned. Often, no doubt, they simply supply an image and a focus for fears due primarily to insecurities that have been caused by other influences in the child's life.

Age appears to be only one of many factors (and often a minor one) in determining the effect of the pictures on children's fears. Some of the comments just made in the discussion of radio programs apply also to the relation of motion pictures to children's fears.

Among other effects of motion pictures, the following have been studied or debated: First, they may have a significant effect on children's ideas, or their mothers' ideas, of style in their clothes and grooming. Second, they may suggest patterns for social behavior, play, manners, and morals, suggest techniques for love-making, and give children images that fit into their own phantasies of adventure or romance (3, 4, 10). Third, an exciting film may affect a child's sleep (53), just as may other exciting experiences. Fourth, little is known about the possible physical effects, at various age levels, of a session of two or more hours in a theater or about the optimal length of presentation from the point of view of the child's health. Fifth, in individual cases there is a discernible relation between the pictures and delinquency and crime (4), although available evidence does not prove that attendance at motion pictures is an important, direct factor in promoting delinquency (2, 34, 42, 53), nor have investigations revealed a significant relation between attendance and moral behavior as measured by dishonesty in school (33). It is possible, however, that more refined research might show cumulative effects on character formation, as well as certain direct and immediate effects that elude large-scale surveys. Comparisons between children who attend the pictures often and children who

attend infrequently have revealed some differences — usually in favor of the latter — in such matters as reputation with classmates and teachers, scholarship, conduct at school (45), and school progress (10). The question arises, of course, whether attendance is a cause of poorer ratings or whether it is one of the effects of the factors underlying the poorer ratings.

Unwholesome effects have undoubtedly sometimes been charged against the motion picture when, in actuality, it has been only one of several influences involved. Regardless of this, however, the findings show very clearly that children obtain, and retain, a large number of impressions from a motion picture; that what they see may have profound physiological accompaniments, and that children's attitudes can be influenced to a definite degree. Each of these general effects obviously suggests that a film may have a salutary or an unwholesome effect. The questions as to what attitudes, what information, and what emotional adjustments are most desirable for children at various age levels are not answered by research dealing specifically with motion pictures. But some values are axiomatic. While granting that children have a right to their interests, it need not be granted that a film should simply exploit these for box-office purposes. As in radio programs, the sincerity and authenticity of the appeal are important things. It is possible to meet children's desire for entertainment, for fun rather than serious self-improvement, for fiction rather than stern reality, without thereby sanctioning the deliberate distortion of fact, the falsification of supposedly real situations, the glorifying of crime and criminal techniques, and the obviously flagrant effort to play upon children's emotions.¹

The development of critical standards in the child's own evaluation of movies, the development of 'adult discount' and 'emotional detachment,' as well as means of promoting this development, have been discussed in some writings. Blumer (3) describes changes with age in a limited number of cases. It was observed that fourth-grade pupils were likely to show frank and unabashed enthusiasm for certain serial 'thrillers'; sixth-grade pupils admitted interest, but were more reluctant to talk and were sensitive to the 'childish' characteristics in the films; eighth-grade pupils showed frank disapproval of such films. Dale and Fruthey (15, 26, 27, 28, 29, 30) summarize reports from various projects and informal studies indicating that efforts to teach

¹ For practical suggestions for parents, see references 47, 56, and 7, p. 14.

motion-picture appreciation at the high-school level can accomplish significant improvements in children's critical evaluations, as well as changes in their tastes. Further study in this area would be helpful.

2. Educational Motion Pictures

The literature on the use of motion pictures for instruction includes a wide variety of studies covering a wide range of grade levels, topics, and subject matter. The emphasis in many studies has been on effectiveness of motion pictures as compared with other visual or oral forms of presentation. Many of the studies have included similar measurements of children from two or more grades, but few studies deal systematically with the reason for the peculiar effectiveness or limitations of motion pictures at one age or grade level as compared with another. Hoban (35, 36) has reviewed a large number of studies in this field, including the series of investigations edited or conducted by Freeman (23, 24, 25, 63). It turns out that motion pictures may be an aid to instruction in connection with a wide variety of subjects and skills and may in varying degrees, in different situations, promote improved learning and retention of facts, mastery of abstract ideas, and increased interest. Within the large amount of research that is available, Hoban notes that "despite the importance of the problem of effectiveness of films for various age and grade levels, there are few reliable data available." [See also Consitt (9), Davis (18), and Mead (46).]

In much of the research on the effects of instructional films, the curriculum that happens to prevail in the locality of the study has been used as the point of departure, with the result that evidence as to whether, and in what subjects or projects, the use of motion pictures might lower the effective age at which a given body of instruction might be introduced, is really inadequate for establishing generalizations. Such information as is at hand suggests, however, that in some areas the conventional placement of units of work according to the child's stage of maturity might be modified if full use were made of motion pictures. What such modifications might be, only an increased use of motion pictures and future research can tell. Certain tentative indications may be cited. Thus, Gutzeit (31) reports that the motion picture, by rendering abstract concepts more concrete, may lower the age at which abstract scientific principles can be taught effectively. He states, by way of illustration, that the micro-structure of matter (molecules, atoms, electrons) is usually difficult for a student to grasp, even during the high-school years, under ordinary conditions of instruction.

With the motion picture, however, it is possible to depict the required motion, to present three dimensions in perspective by means of animated drawings, and to superimpose theoretical interpretations upon actual photography of experimental phenomena. According to his observations, this visualization of theoretical principles "makes them intelligible to the student at an earlier mental age than is otherwise possible."

That motion pictures may help to lower the 'readiness' level in various other areas of study can also be inferred from numerous accounts of procedures that have been followed in classrooms and from informal studies of the effects of motion pictures. A comprehensive summary of reports of this character has been prepared by Dunn and Schneider (20). The reports include comments to the effect that motion pictures enable the children more readily to appreciate abstract, remote, and distant events and conditions in the natural, as well as in the social, sciences. Further systematic study is needed to answer the question as to the areas or topics in connection with which motion pictures, with optimal methods of teaching, might best help to lower the 'readiness' level. Even if this question were answered, there would still remain the problem of which topics, among the several things that the child might be able to grasp, should be emphasized in the curriculum at a given stage of development when due regard is paid to the child's development as a whole.

In addition to studies of the effect of motion pictures in promoting knowledge and retention, several studies have also indicated that motion pictures may stimulate children's imagination (9), stimulate children's interests (8, 16, 24, 43, 61), and promote self-activity (9, 63). Additional systematic studies are needed to explore further these effects as they are related to various developmental levels.

From the reports summarized by Dunn and Schneider (20) it also appears that, while some films and procedures in the use of films are definitely recommended for a limited age or a specific grade level, it has been found feasible to use some films in several grade levels. Judging from the manner in which many commercial films appeal to individuals all the way from six to sixty, it is presumably possible that many types of educational films could be useful over a wide range of maturity. Detailed information as to these topics or themes that might be suitable for a wide grade range would be desirable.

Research indicates that in some areas, at least, the motion picture may be effective in promoting interest and enthusiasm, as distinguished

from mastery of concrete facts. A study by Ramseyer (52) indicates the value of documentary films in rendering high-school children more sensitive to such social problems as soil erosion, flood control, and the like. Here, again, the usefulness of films for this purpose at various age levels and in various fields is in need of further study.

Different answers have been given to the question whether motion pictures are relatively more effective with dull than with bright children (1, 9, 17, 43, 44, 49, 59, 61, 62, 63). The effectiveness apparently varies with the subject taught and with the outcomes desired. Available data suggest that in promoting factual information, films may be relatively more effective with dull than with bright children, whereas they do not seem to be thus more effective in promoting generalization or capacity for discrimination.

The ways in which motion pictures might be used to study the personalities of pupils, to uncover their interests, and to serve as a subtle means of guidance and character education, have not been probed systematically. On the subject as to what is the optimal length of a film at various levels and for various purposes, there is also difference of opinion.

BIBLIOGRAPHY

1. Radio

- (1) BAKER, K. H. "Radio listening and socio-economic status." *Psychol. Record*, 1: 1937, 99-144.
- (2) CANTRIL, H., and ALLPORT, G. W. *The Psychology of Radio*. (New York: Harper and Brothers, 1935. 276 pp.)
- (3) CHILD STUDY ASSOCIATION. "Radio for children—parents listen in." *Child Study*, 10: April 1933, 193-198, 214.
- (4) COLUMBIA BROADCASTING SYSTEM. *Radio in 1937*. (New York: Columbia Broadcasting System, 1937. 56 pp.)
- (5) COLUMBIA BROADCASTING SYSTEM. *American School of the Air: Teachers Manual and Classroom Guide*. (New York: Columbia Broadcasting System. Published annually, 1930)
- (6) DARROW, B. H. *Radio: The Assistant Teacher*. (Columbus, Ohio: R. C. Adams & Co., 1932. 271 pp.)
- (7) EISENBERG, A. L. *Children and Radio Programs*. (New York: Columbia University Press, 1936. 237 pp.)
- (8) EVALUATION OF SCHOOL BROADCASTS. A study sponsored by the Federal Radio Education Committee of the Federal Communications Commission, I. K. Tyler, Director. (Columbus. Ohio State University. In progress)
- (9) EW BANK, H. L. "University of Wisconsin Studies in Education by Radio." (In *Education on the Air*. Proceedings of the Institute for Education by Radio. Columbus: Ohio State University, 1934, 328-335)

(10) FOSTER, J. C., and ANDERSON, J. E. "Unpleasant dreams in childhood." *Child Develop.*, 7. June, 1936, 77-84.

(11) HARRISON, M. "Measures of the effects of radio programs in rural schools." (In *Education on the Air* Proceedings of the Institute for Education by Radio. Columbus: Ohio State University, 1932, 245-258)

(12) HARRISON, M. *Radio in the Classroom*. (New York: Prentice Hall, 1938. 259 pp.)

(13) HARRISON, M. *Radio in Rural Schools—An Investigation*. (New York: Teachers College, Columbia University, 1931. 103 pp. Mimeographed)

(14) JERSILD, A. T.; MARKEY, F. V.; and JERSILD, C. L. *Children's Fears, Dreams, Wishes, Daydreams, Likes, Dislikes, Pleasant and Unpleasant Memories*. (New York: Bureau of Publications, Teachers College, Columbia University, Monograph No. 12. 1933. 172 pp.)

(15) JERSILD, A. T. *Children's Radio Interests* (New York: Teachers College, Columbia University. 1937. Unpublished)

(16) JERSILD, A. T. "Children's radio programs" *Talks*, 3: April, 1938, 41-45

(17) JERSILD, A. T. *The Effects of Radio Programs on Children as Revealed by Interviews with Mothers*. (New York: Teachers College, Columbia University, 1938. Unpublished)

(18) LONGSTAFF, H. P. "Preliminary results of a study of mothers' opinions of children's radio programs" *Jour. Applied Psychol.*, 20: 1936, 416-419.

(19) LOWDERMILK, R. R., and TYLER, I. K. *An Evaluation of the Ohio Radio Announcer in Terms of Its Use and Effects in Ohio Schools*. (Columbus: Ohio State University, Bureau of Educational Research, Radio Bulletin No. 11. 1936. 13 pp. Mimeographed)

(20) LUDINGTON, K. "An experiment in evaluating radio programs." (In *Education on the Air*. Proceedings of the Institute for Education by Radio. Columbus: Ohio State University, 1932, 211-219)

(21) LUMLEY, F. H. *Children's Preferences for Children's Programs* (Columbus: Bureau of Educational Research, Ohio State University, Radio Bulletin No. 6, 1933. 12 pp. Mimeographed)

(22) LUMLEY, F. H. "Does radio broadcasting help pupils pronounce a foreign language?" *The Modern Language Jour.*, 18: March, 1934, 383-388

(23) LUMLEY, F. H. "The pupil's response to radio French lessons." *Educ. Res. Bulletin*, 12: 1933, 181-184.

(24) MACLATCHEY, J. H. (ed) *Education on the Air*. (Institute for Education by Radio. Columbus: Ohio State University. Published annually, 1930)

(25) MARSH, C. S. (ed.) *Educational Broadcasting*. (Chicago: University of Chicago Press, 1933. 463 pp.)

(26) OSTRANDER, L. M. *A Fifth-Grade Radio Program Evaluation Project*. (Unpublished. Lincoln School, Teachers College, Columbia University, 1936. For a brief report, see *New York Times*, Monday, June 1, 1936)

(27) PARKER, L. W. *School Broadcasting in Great Britain*. (New York: National Advisory Council on Radio in Education, Inc. Information series No. 17. 1937. 160 pp.)

(28) POTTER, G. L. "A study of the use of the radio in a group of California schools." *Calif. Jour. Elem. Education*, 5: 1936, 59-64.

- (29) PRINCETON RADIO RESEARCH PROJECT. (Paul F Lazarsfeld, director Princeton University. In progress)
- (30) ROLING, P. "Radio in the sixth grade." *Ohio Radio Announcer*, 3: No. 6: 1938, 1, 7-8.
- (31) TYLER, I. K. *The Daily News Broadcast: Its Place in the School*. (Department of Instruction, Oakland Public Schools, 1933. 16 pp.)
- (32) TYLER, I. K. "Factors in the evaluations of school broadcasts." (In *Educational Broadcasting*. Proceedings of the First Nat. Conf. on Educational Broadcasting. Chicago: Univ. of Chicago Press, 1937, 220-226)
- (33) TYLER, I. K. "Needed research in classroom broadcasting." Pp. 377-385. (In *Educational Broadcasting* Proceedings of the First Nat Conf. on Educational Broadcasting. Chicago: Univ. of Chicago Press, 1937, 377-385)
- (34) TYLER, I. K. "Radio studies in the Oakland schools" (In *Education on the Air*. Fifth Yearbook of the Institute for Education by Radio Columbus: Ohio State University, 1934, 297-312)
- (35) TYLER, I. K., and LOWDERMILK, R. R. (eds) *The Ohio Radio Announcer*. (Columbus, Ohio: Bur. of Educational Research, Ohio State University Published monthly, October to June)
- (36) TYSON, L (ed.) *Information Series*. (New York: National Advisory Council on Radio in Education, 1931)
- (37) WORCESTER, D. A. "What people remember from radio programs" (In *Education on the Air*. Proceedings of the Institute for Education by Radio. Columbus: Ohio State University, 1932, 220-228)

2. Motion Pictures

- (1) ARNSPIGER, V. C. *Measuring the Effectiveness of Sound Pictures as Teaching Aids*. (New York: Teachers College, Columbia University, 1933. 157 pp.)
- (2) BLANCHARD, P. *Child and Society*. (New York: Longmans Green and Co., 1928. 369 pp.)
- (3) BLUMER, H. *Movies and Conduct*. (New York: The Macmillan Company, 1933. 257 pp. Payne Fund Studies)
- (4) BLUMER, H., and HAUSER, P. M. *Movies, Delinquency, and Crime*. (New York: The Macmillan Company, 1933. 233 pp. Payne Fund Studies)
- (5) BURT, CYRIL. *The Young Delinquent*. (London: University of London Press, 1925. 643 pp.)
- (6) CHARTERS, W. W. *Motion Pictures and Youth*. (New York: The Macmillan Company, 1933. Pp. 1-66. Payne Fund Studies)
- (7) CHILD STUDY ASSOCIATION. "What makes a movie 'good'?" *Child Study*, 10: 1933, 191-193.
- (8) CLARK, CLARENCE C. *Sound Motion Pictures as an Aid in Classroom Teaching*. (Unpublished Ph.D. thesis. School of Education, New York University, 1932)
- (9) CONNITT, F. *The Value of Films in History Teaching*. (London: G. Bell and Sons, Ltd., 1931. 431 pp.)
- (10) CRESSEY, P. G., and THRASHER, F. M. *Boys, Movies, and City Streets*. (New York: The Macmillan Company. Payne Fund Studies)
- (11) DALE, EDGAR "Books which children like to see pictured." *Educ. Res. Bulletin*, 10: 1931, 423-429.

(12) DALE, EDGAR. *Children's Attendance at Motion Pictures*. New York: The Macmillan Company, 1935. 81 pp. Payne Fund Studies

(13) DALE, EDGAR. "Child welfare and the cinema." *English Journal*, 26: 1937, 698-705.

(14) DALE, EDGAR. *The Content of Motion Pictures*. (New York: The Macmillan Company, 1935. 234 pp. Payne Fund Studies)

(15) DALE, EDGAR. *Teaching Motion Picture Appreciation*. (Columbus: Bureau of Educational Research, Ohio State University, 1936. 22 pp.)

(16) DASH, A. J. *Effectiveness of Sound Film in Changing Knowledge of and Interest in Chemistry*. (Unpublished master's thesis. City College of New York, 1935)

(17) DAVIS, HELEN C. *Specific Values of Educational Films Used as Supplementary Aids* (Unpublished doctorate thesis. University of Chicago, 1932)

(18) DAVIS, R. L. *The Application of Motion Pictures to Education*. (Unpublished doctorate thesis. New York University, 1923)

(19) DEFEO, G. "When and how children frequent the cinema." *Internat. Review of Educa. Cinematog.*, 4: 1932, 865.

(20) DUNN, F. W., and SCHNEIDER, E. "Teaching with the motion picture and other visual aids." (In *Motion Pictures in Education: A Summary of the Literature*. New York: H. W. Wilson Co., Part 2, 1937, 111-243)

(21) DYSINGER, W. S., and RUCKMICK, C A *Emotional Responses of Children to the Motion Picture Situation*. (New York: The Macmillan Company, 1933. 122 pp. Payne Fund Studies)

(22) FOSTER, J. C., and ANDERSON, J. E. "Unpleasant dreams in childhood." *Child Development*, 7: 1936, 77-84

(23) FREEMAN, F. N., ET AL. *Visual Education*. (Chicago: University of Chicago Press, 1924. 391 pp.)

(24) FREEMAN, F. N., and HOEFER, C. "An experimental study of the influence of motion picture films on behavior." *Jour. Educ. Psychol.*, 22: 1931, 411-425.

(25) FREEMAN, F. N.; REEDER, E. N.; and THOMAS, J. A. "An experiment to study the effectiveness of a motion picture film which consists largely of tables, maps, and charts, as a means of teaching facts or giving abstract information." (In *Visual Education*. Chicago: University of Chicago Press, 1924, 258-274)

(26) FRUTCHEY, F. P. "Can youth's appreciation of motion pictures be improved?" *Educ. Res. Bulletin*, 16: 1937, 97-102.

(27) FRUTCHEY, F. P. "Collecting evidences of children's preferences." *Educ. Res. Bulletin*, 14: 1935, 173-179, 198.

(28) FRUTCHEY, F. P. "Measuring motion-picture preferences." *Educ. Res. Bulletin*, 14: 1935, 67-74.

(29) FRUTCHEY, F. P., and DALE, E. "Evaluating motion pictures." *Educ. Res. Bulletin*, 15: 1936, 163-165.

(30) FRUTCHEY, F. P., and DALE, E. "Testing some objectives of motion-picture appreciation." *Educ. Res. Bulletin*, 14: 1935, 34-37.

(31) GUTZERT, C. L. "Teaching an abstract concept in science by means of the motion picture." *Educational Screen*, 16: 1937, 147-148, 150-151.

(32) HANSEN, J. E. "The effect of educational motion pictures upon the retention of informational learning." *Jour. of Exper. Educ.*, 2: 1933, 1-4.

(33) HARTSHORNE, H., and MAY, M. A. *Studies in the Nature of Character: I. Studies in Deceit*. (Book 1: General methods and results. 414 pp. Book 2: Statistical methods and results. 306 pp. New York. The Macmillan Company, 1928)

(34) HEALY, W., and BRONNER, A. F. *Delinquents: Their Making and Unmaking*. (New York: The Macmillan Company, 1926. 317 pp.)

(35) HOBAN, C. F., Jr. *A Critical Evaluation of the Experimental Literature on Instructional Films*. (Unpublished doctorate dissertation. Duke University, 1935)

(36) HOBAN, C. F., Jr. "Experimental research in instructional films." (In *Motion Pictures in Education: A Summary of the Literature*, by Dale, Dunn, Hoban, and Schneider New York: H. W. Wilson Company, 1937, Part 5, pp 307-366)

(37) HOLADAY, P. W., and STODDARD, G. D. *Getting Ideas from the Movies*. (New York: The Macmillan Company, 1933. 102 pp. Payne Fund Studies)

(38) HOLY, T. C. "Survey of the Schools of Euclid, Ohio" *Bur. Educ. Res. Monog.* (Columbus: Ohio State University, No. 22, 137-138)

(39) International Institute of Educational Cinematography. "Public attendance at the cinema." *Internat. Review of Educ. Cinematog.*, October, 1932.

(40) JERSILD, A. T.; MARKEY, F.; and JERSILD, C. L. *Children's Dreams, Fears, and Fancies*. (New York: Bureau of Publications, Teachers College, Columbia University. Child Development Monographs No. 12. 1933. 172 pp.)

(41) JONES, H. E., and CONRAD, H. "Rural preferences in motion pictures." *Jour. Soc. Psychol.*, 1: 1930, 419-423.

(42) JONES, V. "Children's morals" (In Carl Murchison—Editor *Handbook of Child Psychology*. Worcester: Clark University Press, 1933, 480-533)

(43) KNOWLTON, D. C., and TILTON, J. W. *Motion Pictures in History Teaching*. (New Haven: Yale University Press, 1929. 184 pp.)

(44) MASON, W. L. *A Study of the Status of Motion Pictures in Education*. (Unpublished master's thesis. University of Virginia, 1934)

(45) MAY, M., and SHUTTLEWORTH, F. *Social Conduct and Attitudes of Movie Fans*. (New York: The Macmillan Company, 1933. 142 pp. Payne Fund Studies)

(46) MEAD, CYRUS D. "Visual vs. teaching methods—an experiment." *Educ. Adminis. and Supervision*, 13: 1927, 505-518

(47) MILLER, E. "What children like" *Sight and Sound*, 5: 1936, 131-132.

(48) MITCHELL, A. M. *Children and Movies*. (Chicago: University of Chicago, 1929. 181 pp.)

(49) MOCK, A. A. *The Relative Values of the Use of Motion Pictures with Bright and with Dull Children*. (Unpublished master's thesis. University of Southern California, Los Angeles, 1929)

(50) PETERSON, R. C., and THURSTONE, L. L. *Motion Pictures and the Social Attitudes of Children*. (New York: The Macmillan Company, 1933. 75 pp. Payne Fund Studies)

(51) PORTER, E. McW. *The Curve of Retention in Moving Pictures for Young Children*. (Unpublished master's thesis. University of Iowa, 1930)

(52) RAMSEYER, L. L. *The Influence of Documentary Motion Pictures on Social Attitudes and Sensitivity to Social Problems*. (Unpublished doctorate dissertation, Ohio State University, Columbus, 1938)

- (53) RENSHAW, S ; MILLER, V. L.; and MARQUIS, D. *Children's Sleep*. (New York The Macmillan Company, 1933 242 pp. Payne Fund Studies)
- (54) SEAGOE, M V. "The Child's Reaction to the Movies" *Jour Juven. Research*, 15: 169-180.
- (55) STAFF OF EASTERN HIGH SCHOOL, Washington, D. C. *Moving Pictures and the Adolescent*. (Results of a questionnaire given to pupils of Eastern High School, Washington, D. C., 1935. 47 pp.)
- (56) STODDARD, G. D. *What Motion Pictures Mean to the Child*. (Iowa City: University of Iowa, 1933 Bulletin, State University of Iowa, New Series No. 713, Child Welfare Pamphlet, No. 31, 1933)
- (57) SULLENGER, T. E. "Modern youth and the movies." *School and Society*, 32: 1930, 459-461.
- (58) TENNENBAUM, E. "Rôle of the cinema in children's interests." *Polsk. Arch. Psychol.*, 6: 1933-1934, 163-168.
- (59) TERRY, L. G. *Types of Children's Responses to the Yale Chronicle of America Photoplays*. (Unpublished master's thesis. School of Education, New York University, 1932)
- (60) WASHBURN, C., and VOGEL, M. *What Children Like to Read*. (Chicago: Rand, McNally and Company, 1926. 286 pp.)
- (61) WESTFALL, L. H. *A Study of Verbal Accompaniments to Educational Motion Pictures*. (New York Teachers College, Columbia University, Contributions to Education, No 617, 1934 68 pp.)
- (62) WOLFE, H. G. *An Experimental Evaluation of the Motion Pictures as an Aid in Classroom Teaching*. (Unpublished master's thesis. University of Rochester, New York, 1930)
- (63) WOOD, B. D, and FREEMAN, F. N. *Motion Pictures in the Classroom*. (Boston: Houghton Mifflin Company, 1929 392 pp.)

CHAPTER VIII

THE GRAPHIC AND ALLIED ARTS¹

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he child's artistic development from the nursery school through senior-high-school level may roughly be divided into three periods, including about four years (24). The first includes the years nursery school through Grade III; the second, Grades IV through ; and the third, Grades IX through XII. Although available evi-
e supports this division for practical purposes, it admittedly is
h and tentative, based more upon cross-sectional studies of differ-
children at different age levels than upon longitudinal studies of
ences in the development of the same group of representative chil-
year after year. It should be kept in mind that the child who is
tically competent may not, and usually will not, conform to the
lopmental pace of the typical child.

I. NURSERY SCHOOL THROUGH GRADE III

Two forms of graphic expression feature the period from the nursery school through the third grade. One might be regarded as graphic conceptualizing, which takes the form of drawing outlines of nonly experienced objects. These drawings, following crude begin-
s in the preschool period, grow more and more adequate from to year. Goodenough (9) found that measurement of general
ligence was possible through comparison with age norms, so lar is the improvement in adequacy during this period. The other
lopment is in the form of simple expressions of experience involving
than a single concept, in some instances taking the form of com-

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y of Iowa, 1927-38.

positions. In later development important differences begin to appear at the close of the period. Recognition of esthetic value in the appearance of the face was noted in the development of the Stanford-Binet Test, where recognition of beauty and ugliness was found to be correlated with development of intelligence.

From the point of view of artistic expression and activity the period is one of free play and simple experiences characterized by spontaneity toward objects of the child's interest (7). Occasionally from these whole-hearted and somewhat naïve reactions comes expression in graphic form that is remarkable (1, 2, 12). Imagery in the child is apt to be more vivid than in later years and there is likelihood of less self-consciousness regarding technical imitations. Hurlock found an increase in embarrassment with increased discrimination of detail as children grew older (13). While still in this period a child may attack almost any theme, including fantastic creatures of his own construction (7, 12). Mellinger found that children preferred colored pictures to pictures in black and white, and realistic, rather than conventional, representations (20). Individual differences both in interest and in achievement are found in all groups.¹ The belief that any child, if left alone, will do creative work of merit lacks substantiation, although it has been demonstrated that almost any child will respond to special guidance in drawing (25). Generally speaking, noteworthy creations appear to be the outcome of keenly felt experiences by individuals who are alert, retentive, and possessed of technical skill (19, 26).

It should be recognized that the child during this period is usually not interested in naturalistic representation. Much of his drawing may serve mainly as a means of consolidating and integrating his sensory experiences (9, 21). He frequently draws not what he sees, but rather tries to reproduce what he knows about what he sees. Therefore, apparent errors may not be errors at all. Distortion is 'natural' for a child at this period (10, 30). Objects in his drawing that are important to *him* are likely to be made larger. The dog or man may appear larger than the house. Objects not ordinarily visible may appear through

¹ Griffith, in an elaboration of the approach used by Grippen (12), enumerates eleven stages through which children's drawings pass from the ages of three to six. Space limitations preclude full consideration of the preschool period, but it may be observed that the huge collection of children's work accumulated during the writer's ten-year Carnegie study tends to bear out the Griffith stages only in particular instances. His book, however, is recommended for serious study; see R. Griffith, *Imagination in Early Childhood* (London: Kegan Paul, 1935).

walls or through a person's body — because a child knows they are there. These characteristics of child-art should not cause undue concern when they appear, for they are self-correcting as the child progresses. Likewise, his drawings may reflect an inability to make fine muscular coördinations or delicate eye adjustments (14).

A study by Freeman and Freeman (8) yields interesting findings concerning the types of illustrative material preferred by children of nursery-school age. The preferences of sixty children of nursery-school age were studied by means of direct observation and by means of tests employing the method of paired comparisons. The findings showed a number of outstanding preferences for certain features. In the matter of arrangement, children preferred a number of separate pictures, each a story in itself, with little or no text; as subject matter, children preferred simple and somewhat familiar subjects, creatures, and actions, each with an obvious 'story' (as against imaginary or remote subjects, such as fairies, goblins, dressed-up animals, and subjects foreign to the child's experience); in the illustrations themselves, children preferred strongly outlined figures, simply treated, and presenting bright, crude, contrasting colors.

The training procedure at this period is mainly that of providing suitable material and favorable conditions for work. Creative imagination is furthered by exposure to subject matter likely to enlarge the child's experience. Saunders (25) demonstrated in a crucial experiment over a two-year period that almost any child, under favorable conditions, could make progress in the mechanics of painting and also improve in the creative aspect. Finger painting offers certain advantages to children of this age, and other suitable media and material (as soft chalk and clay) tend to facilitate the process. Grippen (12) and Saunders (25) disclose an inability of some children to project activities. In such cases, it may be helpful for the teacher to call the child's attention to experiences he is likely to have had, thus stimulating the memory and imaginative processes of the child (12, 18, 25).

Even during preschool years many children may display some appreciation of simple esthetic values. Daniels established experimentally that children as young as five years discriminate between, and prefer, balance to unbalance (5). C. Jasper, working with simple rhythm, disclosed a genetic emergence, reaching a plateau about the fifth to the sixth year (15). Whorley (29) found evidence of ability to satisfy the requirements of compositional unity at the third-grade level. These findings were substantiated by a wholly different pro-

cedure by Saunders (25). Color harmony, as investigated by Walton (28), was responded to less adequately at the second-grade level than at earlier periods, but showed gradual improvement to the sixth-grade level of response. Individual variations appeared in all these studies. Several studies have also disclosed variations in technical proficiency, and in the ability to organize a composition (11, 29). Munro is studying the character of children's drawings and may subsequently offer some additional data. In almost any child during this period there may appear occasional products that are good examples of striking realism and freedom of expression (1, 2, 19).

The rôle of the teacher during this period is primarily one of guidance, accompanied by proper appreciative interest and circumspect praise. The teacher can also supply occasional ideas for solution of technical difficulties, when the child seeks help, and, what is very important, the teacher can supervise activities, such as class trips to the bakery, to a farm, or to a fire station, in a way to enlarge the child's experiences with life and provide suggestions for subject matter for his artistic activities (18, 25). Without material to work upon, varied and adequate production is not readily forthcoming (12). The central aim is always to make it possible for the child to initiate and project his own expressive activity and to permit him the satisfaction of being a cause of his own achievement.

A study by Murphy (22), based upon records obtained through direct observation, reports changes with age in the interests and the behavior of children during visits to art museums. Apart from occasional questions, such as "What's this?", preschool children, according to the records, are likely to show little interest in objects of art, as such; they delight, however, in playing with art materials, and in using the museum quarters for play. At five years, children were found to ask more specific questions, and to exhibit a sustained interest in some objects, especially animals, such as pets and 'zoo' specimens. Six-year-olds were found to exhibit a strong interest in homes, and it was also noted that they frequently requested stories about objects on display in the museum. Also dramatization of experiences associated with the museum was observed during their free play. At seven and eight years, interests were found to have widened, and the children were more disposed to spend some time on informal projects, such as listening to accounts of the life of Indians, making Indian utensils, costumes, homes, and pictures, and participating in discussion of the project.

II. GRADE IV THROUGH GRADE VIII

During this next stage even greater individual variations are evident. The child is likely to grow increasingly aware of limitations in his technique (30). Interest in art will begin to suffer somewhat from the competition of other activities. Furthermore, the child will be cognizant of a multitude of new objects and interests that will complicate the matter of choice of subject matter. The school can provide for this situation to some degree by offering a varied art program (11).

From the study by Murphy (22) we note that children nine and ten years old continued with increased zeal an interest already shown at an earlier age in adventure and in remote peoples and places. Identification with explorers and a display of interest in materials associated with battles and heroic exploits were frequently observed. At this age, also, the children showed an interest in methods of production, tools, and other materials of everyday use in the lives of peoples who appealed to them. According to the observations, hesitation and embarrassment in connection with artistic expression were noticeable at this age. This condition was found to be accompanied by more and more requests for craft activities, and a withdrawal from painting activities, especially on the part of children whose paintings did not receive general adulation. At eleven years, likewise, many children exhibited dissatisfaction with their artistic products; at this age there appears an increased interest in objects associated with social problems, both present and past. The interests of children aged twelve to fourteen were found to approximate those of adult visitors.

With the artistically superior child there need be no interruption of progress throughout this period. With normal maturation his interests will widen, his objectives will broaden, his products increase in successful attainment, and if this is accompanied by appropriate instruction in appreciation, the character of his compositions will become more and more valuable as art products (27).

In the case of the typical child at the beginning of the junior high school, there appears a drop in interest in art. This might, perhaps, be forestalled somewhat by revising the curriculum in such a way that the number and variety of artistic activities that are provided are sufficient to enable individual pupils to find some activities in which they may have particular interest and facility. By virtue of the competition of other interests, the decline in make-believe preoccupations, and the increasing specialization of interests on practical projects, a formal

requirement that all pupils work at every type of art activity that is provided may do more to create in the child a distaste for art than to increase his competence. When individual interests and aptitudes are recognized, the school will not prescribe an inflexible program that applies alike to the child who happens to have a liking for 'tight' work (such as mechanical drawing) and to another child who is more interested in freehand work with charcoal.

It is still generally the case that the art curriculum and the teacher's way of thought are likely to favor the view that training is designed to produce artists, despite the fact that fewer than five percent of any school population have any prospect of becoming creative persons in painting and similar fields. Every child, however, will be a *consumer* of art. Therefore, instruction that is offered throughout the junior- and senior-high-school periods should tend to promote a constantly deepening interest in the art aspect of life (4). Much gain will ensue from a closer approximation of the art activities to the pupils' interests and the community's interests. Research is needed to demonstrate ways in which attention can be called to the art factor in many matters that usually escape the attention of textbooks, such as in the design of automobiles, public buildings, manufactured articles of all kinds, as well as in caricature and other media of social control, in wartime propaganda, in the movies, and in advertising.

To help the pupil achieve some comprehension of the factors that make for good design in any object is an important function of art education, and is a phase of art education in need of further research. Another significant objective of training in art is to promote understanding of the formal relations between part to part and part to whole and the manner in which the total or unified effect is obtained (19). On the subject of what constitutes value in art there is still lack of agreement; moreover, there is a paucity of research into the content and procedure in instruction in art appreciation as related to the factor of the child's maturity.

III. GRADE IX THROUGH GRADE XII

Concrete research data are meager on the subject of developmental characteristics during this period. Competent observation, corroborated by many scientifically minded teacher-investigators (16, 25, and others), shows that a weeding-out process has delimited the number of pupils who at this period exhibit interest and competence in art activities. Competition of other interests and the election of other voca-

tional studies tend to divert the student to other activities. In most cases the process of appreciation has outrun the ability to produce. The self-critical attitude militates against the best work; spontaneous drawings are largely absent. The avoidance of art by large numbers of children at this stage is a subject needing thorough study.

Recent research tends to disclose that the requirements of success in art activities (especially painting) are more and more rigid, with the result that the numbers are limited. Clair (3) found great differences among students in ability to perceive subtle esthetic qualities, as measured by a comprehensive check-list procedure. Kellett (16), in an experimental study in which a projection technique was used with photographs and paintings, found that pupils were likely to give stereotyped verbal reactions to the unity aspect of paintings. McCloy (17) found that measurements of creative imagination yielded scores approximately conforming to the normal distribution curve. Meier (19) found that only about six percent of high-school art students were capable of responding to materials that had an abstract character and that made it necessary to educe a generalization from the artist's material. All the foregoing studies agreed that superior ability, *even among those electing art*, was restricted to a relatively small proportion of the population. It is possible that this situation could be altered by revision of the curriculum. Further research would be decidedly helpful in this connection.

Undoubtedly, at this level, creative expression can be associated with innumerable activities, such as the rearranging of furniture, the selection of an ensemble in dress, the planning of a menu for a dinner, the modelling of designs for cars and other equipment, the construction of new advertising layouts, the study of suggestions for a 'new' architecture from Mayan and other forms. Systematic study is needed to reveal ways in which such practical turns might best be employed to hold the interest of the large number of pupils who shun formal art.¹

An extensive field for study lies in the possibilities of revising, enlarg-

¹ It seems appropriate to say that this Society, with the aid of the Carnegie Foundation for the Advancement of Teaching, is subsidizing a yearbook on "Art Education," to appear in the not-too-distant future. The late Dean Haggerty, of the University of Minnesota, whose lively interest in the Owatonna Art Project was known to many workers in this field, was chairman of the Society's Committee at the time of his death. Chairmanship of the Society's Committee is now assumed by Thomas Munro, Educational Curator of the Cleveland Museum of Art.—*Editor.*

ing, and vitalizing the art curriculum in the senior high school. The stereotype of the artist as a temperamental, erratic portrait-painter should be supplanted by a correct picture of the artist in modern life, with a shifting of the scene from the Latin Quarter to such areas as the motion-picture studio, the fashion designer's quarters, and the advertising office. This does not in any sense imply a new emphasis upon 'commercial art,' but merely a correction and expansion of the idea of the place of art in modern life.

IV. A COMMUNITY PROJECT RELATED TO ART EDUCATION

This reference to the place of art in modern life and to the variety of ways in which creative and esthetic interests may be manifested suggests the calling of the reader's attention to another way of approaching the problems of the curriculum in the fine arts; namely, by investigating the possibilities of various phases of art and of art education in a typical community.

At the suggestion of the Yearbook editor and through the courtesies of Robert Hilpert and Edwin Ziegfeld, of the Department of Art Education, University of Minnesota, a brief statement concerning one such project follows.

The Owatonna Art-Education Project

The Owatonna Art-Education Project, financed by the Carnegie Foundation for the Advancement of Teaching and the Carnegie Corporation of New York City and conducted by the University of Minnesota, was set up in terms of three major purposes: (a) to develop a method of community analysis, (b) to develop a functional course of study in art, and (c) to develop an interest in the possibilities of art in daily life in the community.

The analytic survey was conducted by means of conferences with residents, questionnaires, classes in art, assistance with community and individual art problems, and co-operation with agencies interested in art.

The development of the course of study in art was the major activity. Many types of art problems and projects were developed and tried in the school situation, resulting in a course of study in art from the first grade through the twelfth. This is being put into form for publication. The integrative and correlating possibilities of art were extensively investigated.

The development in the community of an interest in the possibilities in art was always in terms of expressed wishes and needs of the residents. It led to evening classes in art, lectures to study and community groups, service projects and summer schools for both teachers and residents.

Work in Owatonna was begun in September 1933 and continued over a five-

year period. The project has been partially described in several publications by the University of Minnesota Press (1935, 1936, 1938), and a detailed account of the results may be expected in due time.

BIBLIOGRAPHY

- (1) BERGEMANN-KONITZER, M. *Das plastische Gestalten des Kleinkindes*. (Weimar: Herman Bohlaws Nachfolger, 1930)
- (2) BERGEMANN-KONITZER, M. Entwicklungsaufbau plastischer gestaltung. *Z. f. Jugendk.*, 5: 1935, 42-50.
- (3) CLAIR, M. B. "The perception of complex aesthetic qualities in paintings." (Unpublished. See Reference No. 19)
- (4) D'AMICO, V. "High lights of a study of art in our schools." (In *Art Education Today*. New York: Teachers College, Columbia University, 1936, 1-16)
- (5) DANIELS, P. "Discrimination of compositional balance at the preschool level." *Psychol. Monog.*, 45: 1933, 1-11.
- (6) DATTA, A. "Drawings of children" *Indian Jour. Psychol.*, 10: 179-182.
- (7) ENG, H. *The Psychology of Children's Drawings*. (New York: Harcourt, Brace, and Company, 1931, 223 pp.)
- (8) FREEMAN, G. LAV., and FREEMAN, R. S. *The Child and His Picture Book*. (Chicago: Northwestern University Press, 1933. 102 pp.)
- (9) GOODENOUGH, F. "Children's Drawings." (In *Handbook of Child Psychology*. Worcester: Clark University Press, 1931, 480-514)
- (10) GORGI, H. "The supposed errors in drawing common to beginners." Cairo, Egypt. (Proceedings International Congress for Art Education, Paris, 1937)
- (11) GRAEBE, H. "Das Turzeichnen der kinder." *Z. Padog. Psychol.*, 1935.
- (12) GRIPPEN, V. "A study of creative artistic imagination in children by the constant contact procedure" *Psychol. Monog.*, 45: 1933, 63-81.
- (13) HURLOCK, E. B., and THOMPSON, J. L. "Children's drawings: an experimental study of perception." *Child Develop.*, 5: 1934, 127-138.
- (14) ISAACS, S. *The Children We Teach: Seven to Eleven Years*. (London: University of London Press, 1932. 176 pp.)
- (15) JASPER, C. "The sensitivity of children of preschool age to rhythm in graphic form." *Psychol. Monog.*, 45: 1933, 12-25.
- (16) KELLETT, K. "The function of unity in aesthetic perception." (Unpublished. See Reference No. 19)
- (17) McCLOY, W. "A study of creative imagination in children and adults." (Unpublished. See Reference No. 19)
- (18) MANGRAVITE, P. "The artist and the child." Pp. 119-133. (In *Creative Expression through Art: A Symposium*. New York: The John Day Co., 1932)
- (19) MEIER, N. C., ET AL. "Studies in the psychology of art," Volume III. (In preparation. To appear in *Psychol. Monog.*)
- (20) MELLINGER, B. E. *Children's Interests in Pictures*. (New York: Teachers College, Columbia University, Contributions to Education, No. 516, 1932)
- (21) MOTT, S. M. "The development of concepts: a study of children's drawings." *Child Develop.*, 7: 1936, 144-148.

- (22) MURPHY, M. *Observations of the Interests and Behavior of Children during Visits to Art Museums.* (Education Division, Brooklyn Museums, New York, 1938. Unpublished)
- (23) MURSELL, J. "Some generalizations concerning art education." (In *Art Education Today*. New York: Teachers College, Columbia University, 1936, 1-6)
- (24) NICHOLAS, F.; MAWHOOD, N.; and TRILLING, M. *Art Activities in the Modern School* (New York: The Macmillan Company, 1937. 132 pp.)
- (25) SAUNDERS, A. W. "The stability of artistic aptitude at the child level." *Psychol. Monog.*, 48: 1936, 126-154.
- (26) TIEBOUT, C., and MEIER, N. "Artistic ability and general intelligence." *Psychol. Monog.*, 48: 1936, 95-125.
- (27) VOSS, M. D. "A study of conditions affecting the functioning of the art appreciation process at the child level." *Psychol. Monog.*, 48: 1936, 1-39.
- (28) WALTON, W. E. "The sensitivity of children and adults to color harmony." *Psychol. Monog.*, 45: 1933, 51-62.
- (29) WHORLEY, K. "Sensitivity of children to compositional unity." *Psychol. Monog.*, 45: 1933, 26-45.
- (30) ZAKER, A. "Manual and visual tendencies of children." Cairo, Egypt. (Proceedings International Congress for Art Education, Paris, 1937)

CHAPTER IX

READING

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In harmony with the major assumptions underlying this Yearbook, curricula in reading should be based on facts concerning the growth and development of children and concerning their abilities, interests, and needs at each level of advancement. Support for this view is found in the results of research that reveal significant correspondence between a child's level of development and the success accompanying the use of certain types of subject matter and teaching procedures. Other facts, such as the time when various types of experience will be individually most satisfying and socially most fruitful, should also be considered. To organize a reading curriculum, opportunity is, therefore, a fundamental responsibility of the curriculum-builder. To adjust the content and methods used in teaching reading to the maturity, experiences, interests, and needs of particular pupils is a challenging opportunity for teachers at all levels.

Unfortunately, reading curricula in the past were organized chiefly in terms of activities assumed to be desirable at the respective grade levels. The inadequacy of this practice has been emphasized repeatedly in recent literature. Other factors, such as the physical, mental, emotional, and social maturity of the learner, merit due consideration. Furthermore, the work usually prescribed in earlier curricula and the standards of achievement proposed were uniform, as a rule, for all pupils. That such requirements have been inappropriate in general and detrimental to the welfare of many pupils in particular has been clearly demonstrated by wide classroom experience and by numerous experiments. Because pupils mature at various rates and exhibit different characteristics at given levels of advancement, individual differences (30, pp. 325-356) should be recognized and provided for. This includes, among other things, the provision of initial reading experiences at different age levels, the selection of later reading experiences in terms of the varying achievements and interests of

pupils, and the adaptation of the content and methods of teaching to individual needs.

In view of the foregoing statements, it is obvious that we now face, as has been said, challenging problems in reorganizing curricula and in improving the teaching of reading. To promote progress in these directions, we need, first, a clear understanding of the basic facts and principles relating to the growth and development of children and their characteristics and needs at each level of advancement. Many such facts are summarized in detail in other sections of the Yearbook and will be referred to frequently in this chapter. Second, we need to identify the stages of development through which pupils normally pass in acquiring mature reading attitudes and habits. An effort will be made in what follows to describe such stages and to relate them to appropriate levels of child development. Finally, we need to know the types of subject matter and teaching procedures that harmonize with the characteristics, interests, and needs of pupils at the successive stages of development in reading. These facts and relations will be considered in the latter part of this chapter.

I. STAGES OF DEVELOPMENT IN READING

Before reviewing evidence relating to stages of development in reading, a word of explanation may be appropriate. Growth in reading is recognized as a continuous process throughout the school life of the child, and also during later years. A "stage of development" is conceived as a part of this continuous process of growth in reading interests, attitudes, and habits. The successive stages are not clearly differentiated from each other in all respects. For example, growth in depth of comprehension continues at a relatively uniform rate throughout several stages of development. On the other hand, certain phases of reading develop much more rapidly at some stages than at others and also attain maturity much earlier than do other phases (30, pp. 73-74). As a result, it is possible to identify sections of the general curve of development that are characterized by important types of growth, by strategic goals, and by significant teaching problems. We are concerned, of course, with the common characteristics and problems of the various stages of development as well as with differences that distinguish them. In attempting to identify and describe the successive stages of development in reading, evidence from three sources will be utilized: the results of general studies concerning child development, the literature relating to children's interests in reading, and records of the progress of children in different phases of reading.

1. Growth in Attitudes and Traits

Detailed studies of children show that they exhibit different attitudes and traits as they mature physically and mentally. According to Judd (23), for example, primary children, as a rule, are more or less imitative, are deeply interested in the people and things in their immediate environment, are easily influenced by example, and are to a large degree uncritical and easily satisfied with their attainments. However, new attitudes and traits soon begin to appear, and these are exhibited more or less prominently in the middle grades. Instead of being docile and imitative, children become increasingly self-conscious, self-assertive, and more or less combative. These characteristics are a natural sequence of the stage of social imitation that preceded. The junior-high-school years usher in a new era. With adolescence come new interests, changed attitudes, and definite aspirations. The pupil is now conscious of himself in a new sense and approaches society in the mood of one seeking admission.

These examples suggest types of changes in the mental and social attitudes and traits of children that occur as they advance toward maturity. Skillful teaching takes account of these changes and considers their implications with respect to reading materials and the methods of teaching used. During the early primary period, for example, children are keenly interested in accounts of home and school life, of their pets, toys, and games, and of the activities of their parents and of other people who contribute to their immediate needs. The pupils of the middle grades have much broader interests. They want to explore things for themselves, to wander about the world and to see its strange sights. Extensive reading about a variety of interesting topics is a natural outgrowth of the unique characteristics of the child during this period of development. At the junior-high-school level boys and girls demand new types of experience in harmony with the broader personal and social interests that develop with adolescence. It follows that at least three broad divisions of a reading program are suggested by the changing attitudes and interests accompanying the physical and mental development of children from five to sixteen or more years of age.

2. Children's Interests in Reading

The results of studies of the reading interests of pupils support the foregoing conclusions and reveal additional facts of considerable significance in organizing reading activities. As pointed out by Terman and Lima (31, p. 31) there are "certain well-defined tendencies in read-

ing interests that change as the child's experience grows and as his imagination and reasoning power develop." Prior to the age of five nearly all children express an interest in stories that are read or told to them and delight to look at pictures and to discuss them with others. One of their interests at this early age is "in jingles and nursery rhymes," owing largely to the young child's appreciation of rhythm. In addition to this interest, animal stories and "nature stories" involving conversation make a strong appeal. At the same time, simple factual stories about things and happenings in the child's environment are in great demand.¹ Such materials continue to absorb the child's attention until his contacts and experiences develop new centers of interest. The time at which this occurs varies widely with individuals.

The extent to which children of school age exhibit an interest in independent reading will be considered next. With very few exceptions, investigators (18, pp. 158-159) report that the percentage of children who read books of their own accord increases rapidly during the primary and middle grades and reaches a relatively high level by the beginning of the junior-high-school period. Divergent tendencies are found in both junior- and senior-high schools. In some schools many pupils continue to read widely; in other schools there is a notable decrease in the amount of reading done. These trends undoubtedly reflect differences in the character of the stimulation and guidance provided by teachers and in the accessibility of interesting reading material. Obviously, a major problem of the primary grades is to provide the conditions and stimuli that will result in arousing interest in independent reading. In the middle grades, a wide range of material of various levels of difficulty and relating to numerous interests that are prominent during this period is required. The junior- and senior-high-school years are recognized both in this country and abroad as a critical period in maintaining interest in reading, owing largely to the appearance with adolescence of many distracting interests and conditions (31, pp. 28-29). As a result of a study of vocational school pupils that

¹ In this connection see Marjorie Manton. "An objective method for recording three- and four-year-old children's enjoyment of stories, particularly applied to a study of fanciful and realistic stories." *Studies in Preschool Education*, I, guided by Ruth Updegraff, published by the University of Iowa, 1937. Manton shows that of the 61 children in her study only 8 expressed any comprehension of the fanciful. The four-year-olds expressed more enjoyment of the fanciful stories than did three-year-olds.

extended over a period of twelve years, Rasche (29, p. 134) found that satisfactory progress had been achieved during this period primarily with the more capable pupils who were able to read reasonably well. The less capable pupils, however, still present very serious problems in efforts to establish reading interests.

Of major importance are facts revealed by studies of what pupils like to read. The outstanding discovery (31, pp. 46-76) about their preferences is that they differ widely at each age and grade level. Such differences are due in part to the fact that the interests of boys and girls differ significantly with mental age, brightness, reading achievement, home environment, and previous experiences. It is impossible, therefore, to provide adequately for the reading interests of all members of a group without a wide range of reading materials. These conclusions differ radically, of course, from the view that prevailed earlier to the effect that all children passed relatively uniformly through specific stages of development in reading interests. Although interests differ widely at the respective age levels, certain general trends are discernible throughout the grades and the high school. Before summarizing the results of studies in this connection, it should be noted that what children read is determined to no small degree by availability and custom. A comparison between the results of earlier and of more recent studies provides clear evidence of changes in the content of reading among children over a period of years. Children's librarians have also reported observations to this effect. It is necessary, therefore, to interpret cautiously the general results of studies of children's interests in reading. With these reservations in mind, certain facts revealed by investigations of children's interests will be presented.

In a summary of studies of reading interests at the primary level, Celestine (6, p. 92) found that interest in animal stories, nature stories of the fanciful type, stories of children and familiar experiences, and the simpler fairy tales was prominent. Furthermore, a detailed study of interest factors in primary reading led Dunn (11, p. 49) to conclude that the characteristics that may be expected to arouse interest among primary pupils are "surprise and plot for both sexes, animalness for boys, and childness, familiar experience, and to a lesser degree repetition and conversation for girls." She did not find that the interests of the children were highly specialized, nor did she secure evidence that the primary child is in an "age of pure fancy," nor that legends and folk tales as a class "are the most interesting of all possible material for primary pupils."

Between the ages of eight and ten, significant changes in reading interests make their appearance. For example, Celestine (6, p. 92) found that animal stories of a realistic character become a dominant interest by the age of nine, that adventure as expressed in the Boy Scout Series is interesting to boys, that stories of home and school life are attractive to girls, and that stories of children in other lands are very interesting to both boys and girls. During the next two years the interest of boys in adventure continues to increase. Furthermore, stories of invention and informational material begin to make an appeal. In the case of girls, interest in fiction reaches a high point about the end of the eleventh year, and stories of adventure and accounts of people become increasingly popular. As a result of an intensive study in Grade IV-A to VI-A, inclusive, Lazar (25) found that the following elements proved to have a general interest appeal: adventure, action, excitement, thrills, mystery, realism, suspense, child life, humor-mischief, animal life and nature, sportsmanship and bravery, sports, airplanes, and other inventions. The statement should be added that the amount of reading done and the specific character of the material read varied significantly among bright, average, and dull children.

During the period from twelve to fifteen, reading interests are definitely affected by physiological and psychological changes to which reference was made earlier. Boys and girls in common acquire broader interests in their social and natural environment. History, biography, and adventure enlist increased interest. A taste for humor is acquired and magazines are read more and more widely. Boys become deeply absorbed in books and articles relating to hobbies, how to make things, and specialized interests of various types. The interest of girls in adult fiction of the sentimental type and in poetry becomes increasingly evident. By the age of fifteen the reading interests of both sexes are more or less definitely formed. Boys express a preference for newspapers and current events, for accounts of sports, and for materials relating to topics of special interest in the field of vocational activities. In common with girls they read a great deal of fiction, much of which is sensational or which portrays impossible situations. Other types of material read widely by girls are poetry, biography, and books of humor. Studies made by LaBrant (24, p. 42) show that the adolescent child responds readily to reading materials that relate to his own culture pattern or level.

The preceding paragraphs present a very inadequate account of the breadth and variety of the reading interests of pupils up to fifteen years

of age. The facts reported, however, supply striking evidence that the interests of children change with increasing age and maturity and that the larger divisions of the school curriculum (primary, middle grades, junior high school) are characterized in general by significantly different interests. In making this statement, the fact is recognized that interests at one level merge gradually into those of another and that they vary notably with such factors as mental age, sex, experiential background, availability of material, and home influence. Nevertheless, they provide a valuable basis for the organization of reading programs that are highly charged with interest and that enlist whole-hearted effort.

3. Growth in Specific Phases of Reading

The nature of the reading activities provided by the school at successive levels of advancement is determined not only by the general maturity, attitudes, and interests of pupils, but also by the progress they make in reading. In this connection, the fact is widely recognized that children pass through successive stages in acquiring mature reading habits (18). For example, they master a basic meaning vocabulary before they can read widely with ease and comprehension; they learn to recognize words in thought units before they can read aloud fluently and with rhythm of expression. Although children differ widely in the rate at which they master the various phases of reading, the order of growth seems in general to be about the same. Unfortunately, the number of facts available concerning growth in specific phases of reading is somewhat limited; furthermore, the facts are based on the results of instruction as it has been given in the past. Consequently, conclusions relating to the most appropriate periods in the school life of the child in which to emphasize given phases of reading must be tentative and subject to revision from time to time. However, the general trends that have been identified and their implications merit careful consideration.

a. Oral Reading. Important facts concerning growth in oral reading will be considered first. Records of growth in rate and accuracy (18, pp. 148-150) show that pupils make surprisingly rapid progress during the first four grades, steady but less rapid progress during the fifth and sixth grades, and very little progress at the high-school level. By the end of the fourth grade a majority of pupils have acquired four-fifths of the achievement of college graduates, as measured by the tests in current use. Photographic records of eye-movements while reading orally (5) lend support to the foregoing conclusion concerning progress in the

primary grades. During the first four grades the span and the rate of recognition and the progress of perceptions along the line of print improved very rapidly. During the fifth and sixth grades some improvement was recorded, but it was relatively slight in comparison with that of the earlier grades. By the end of the sixth grade a very large proportion of the pupils approached maturity in the fundamental habits involved in oral reading. Only slight progress was made at the secondary-school level. The statement should be added that individuals varied widely from the general trends described, owing to a variety of factors like differences in intelligence, nationality, home background and environment, and the effectiveness of the instruction provided. Furthermore, girls in general made significantly more rapid progress than boys in the mastery of habits involved in oral reading.

b. Eye-Voice Span. With respect to eye-voice span; that is, the distance between the eye and the voice in reading aloud, Buswell (4) found that growth occurred steadily from the second to the fifth grade, inclusive. By the end of that grade, a pupil should be able "to maintain an average eye-voice span as wide as the average for any of the school grades above that year" (4, p. 41). These facts suggest the possibility of relatively high achievement among the better readers in the primary and early intermediate grades. In the case of slow learners, however, development occurs far more slowly and continues in some cases until the end of the high-school period. The fact merits vigorous emphasis that pupils vary widely in their rate of development in the phases of oral reading to which reference has been made. Furthermore, there is evidence within each group of variations in the order in which the different elements develop — variations that are associated in part with the methods of teaching employed.

c. Speed of Silent Reading. We treat next growth in speed of silent reading. Records from various sources (18, pp. 131-135) show that pupils increase rapidly, on the average, during the primary grades and continue to improve steadily throughout the fourth, fifth, and sixth grades with only slight improvement at the secondary-school level. Thus approximate maturity in speed of normal reading may be attained by the end of the elementary-school period. The improvement that occurs at the secondary-school level is in reading difficult material, especially material that requires good thinking and careful interpretation. The character of the growth curve in speed of silent reading may be explained in part in terms of progress in the fundamental habits of recognition. As reported by Buswell (5), growth in

rate and span of recognition and in the rhythmical progress of perceptions is very rapid during the first four grades. During the fourth, fifth, and sixth grades, improvement is significant only in rate of recognition. In the secondary school, some improvement occurs in span of recognition and in the rhythmical progress of perception.

It should be kept in mind, then, that relatively mature habits of reading simple material are gained as early as the fourth and fifth grades in some schools. The advantage of early development of such habits is apparent; furthermore, it is often disadvantageous to postpone their development unduly. If pupils read slowly for several years the habits involved become so firmly established that it is far more difficult to modify them than it is to develop good habits during the formative period. As a rule, speed of silent reading is given specific attention as soon as the rate of recognition exceeds the rate of vocalization. This occurs (18, p. 133) in the case of many pupils as early as the second grade; with slower readers it does not occur until the third or fourth grade.

d. Comprehension. We shall next consider growth in three phases of comprehension. Accuracy in apprehending the meaning of simple passages occurs very rapidly in the primary grades (18, p. 94) and may reach a high level by the end of the third grade. Speed in apprehending the meaning of simple passages increases rapidly during the primary grades and continues to improve steadily throughout the fourth, fifth, and sixth grades. Depth of interpretation improves rapidly throughout the elementary, secondary, and college levels. Obviously growth in comprehension and interpretation in reading are intimately related to growth in other phases of reading and to child development in general. This fact is further emphasized by the nature of the progress curve for comprehension in oral reading. When pupils (18, pp. 95-96) were tested on the simplest paragraph in an oral reading test, they did about equally well at the respective grade levels, whereas, when tested on the hardest paragraphs that they could read without error, their comprehension scores decreased notably in the third and fourth grades. This indicated that during the third grade their ability to pronounce words exceeded their ability to interpret meanings. Obviously at this stage of development special attention is necessary to the interpretation of meaning. If appropriate guidance is provided, rapid improvement in comprehension occurs during the middle and upper grades.

e. Meaning Vocabulary. The foregoing facts emphasize the importance of a wide meaning vocabulary in reading. If a child's ex-

periences are meager and his meaning vocabulary limited, he cannot comprehend effectively the materials usually assigned in school. A recent survey of studies relating to growth in meaning vocabulary (19, pp. 9-17) led to the following conclusion:

That the meanings of words are acquired slowly as a rule, that some are learned relatively early and others not until quite late, if at all, in the school life of the child, and that individuals differ widely in the rate at which they acquire meanings. Furthermore, the character of the definitions attached to words changes notably from the lower to the higher grades. The period from nine to fifteen is particularly productive in the acquisition of meaning. One of the facts emphasized repeatedly by all investigators is the surprising lack among children of clear, accurate meanings of words. The development of such meanings is a specific obligation of teachers at all grade levels and in each field of study.

4. Important Stages of Development in Reading

The detailed records on which the foregoing facts are based justify three general conclusions of wide significance: first, pupils pass through various stages of development on their way to mature reading habits; second, the rate of progress varies widely among pupils; and third, the progress made by pupils at a given level varies definitely with such factors as the learner's general stage of development, his interest in reading, his attainments and difficulties in reading, his ability to learn, his nationality, home background, and environment, and the amount and effectiveness of the stimulation and guidance that he receives. These findings justify skepticism concerning traditional types of reading curricula organized primarily on a grade basis. They suggest rather that reading instruction should be organized in harmony with facts relating to child development and that the guidance provided in each classroom should be adapted to the varying stages of development and needs of the pupils.

The facts already presented show that in general children of elementary- and secondary-school age may be classified into three groups, or levels, with respect to their stage of mental and social maturity and their dominant attitudes and interests. These general classificatory levels are commonly designated by the terms 'the primary,' 'the intermediate,' and 'the adolescent' child. The broad distinctions between these stages are helpful in organizing curricula in general and reading instruction in particular. In providing instructions for particular groups, it is imperative that individual differences be recog-

nized and adequate provision be made for varying abilities, interests, and needs.

Growth in reading harmonizes closely with the general stages of development just mentioned. In addition, the general period of development represented, as a rule, by children in the kindergarten and primary grades may be subdivided into three stages of development in reading, each of which has its unique aims and problems (30). The characteristics of each will be described in detail later. In harmony with the results of the foregoing analysis, the discussion that follows will be organized in terms of five stages of development in reading, extending from the kindergarten to the end of the secondary-school period. These are: first, the stage at which readiness for reading is attained; second, the initial stage in learning to read; third, the stage of rapid progress in acquiring fundamental reading attitudes and habits; fourth, the stage at which experience is extended rapidly and increased power, efficiency, and excellence in reading are acquired; and fifth, the stage at which reading interests, habits, and tastes are refined.

II. CURRICULAR PROBLEMS AT THE RESPECTIVE STAGES OF DEVELOPMENT IN READING

We shall now describe the characteristics and needs of children at the respective stages of development in reading and briefly outline appropriate curricular materials and teaching procedures.

1. The Stage at Which Readiness for Reading Is Attained

Readiness for reading is the product of the mental, physical, emotional, and social development (20) of the child during his preschool, and not infrequently, also, his early school years. The requisites of readiness for reading (18, pp. 79-85; 20, pp. 5-30) include, among other items, keen interest in reading; reasonably wide experience; facility in the use of ideas; ability to solve simple problems and to do abstract thinking of a very elementary type; ability to remember ideas, word forms, and the sounds of words; a reasonable range of vocabulary; command of simple English sentences; good health, vision, and hearing; ability to see likenesses and differences in word forms and to discriminate between sounds of words; normal speech organs; emotional stability; and some degree of social adjustment. As indicated in other sections of this Yearbook, growth in most of these characteristics is natural during the early years of childhood.

In certain respects children develop and mature largely through

processes of inner growth (1, pp. 66-68; 7, p. 282; 18, p. 80). For example, several aspects of vision, such as the distance between the pupils of the eye (1) and farsightedness (7), are recognized as phases of anatomical maturation or growth. It is often recommended in such cases that reading be postponed until time has eliminated the handicap. Evidence has accumulated, however, showing that physiological handicaps, especially those of a sensory type, may interfere with progress in reading at any stage of development. The remedy lies, in part at least, in the correction of constitutional handicaps or in adjustments to them, rather than merely "waiting for time to cure them." Very frequently adjustments (17) can be made advantageously to visual defects through the use of larger-sized print or through greater emphasis upon auditory or kinesthetic methods of teaching. The statement should be added that the need is urgent for additional scientific studies of the types of physical deficiencies, including vision and hearing, that interfere seriously with learning to read and the kinds of corrections or adjustments, if any, that will compensate wholly or in part for the handicaps they impose.

Readiness for reading is largely the product of experience, guidance, and specific training. The fact has been demonstrated repeatedly (20, pp. 31-58) that appropriate experiences and guidance in the home, the kindergarten, and the early part of the first grade aid materially in promoting reading readiness. Indeed, controlled experiments (37) show clearly that pupils who have received appropriate preliminary experience and training make much more rapid progress in reading than do otherwise comparable groups of children. The major types of instruction provided (18, pp. 82-85; 20, p. 32) are those that extend and enrich experiences essential to a clear grasp of meaning, that provide training in the use of ideas and in simple problem-solving activities, that promote language development, including growth in vocabulary, a command of simple English sentences, and refinement of habits of enunciation and pronunciation, that train in visual and auditory discrimination, and that stimulate interest in learning to read. However, readiness for reading is not determined uniformly by the presence or absence of certain attitudes and attainments; it is rather the product of combinations of factors that differ somewhat among individuals.

Furthermore, the amount of growth that should be attained before reading is introduced cannot be defined with precision at present. As shown experimentally by Gates (15), readiness is determined in part by the character of the materials, methods, and general procedures

adopted in teaching pupils to read. For example, a program that made abundant use of individualized, self-diagnostic materials and that enabled the teacher to discover the particular needs of pupils and to make adjustments to them was much more effective with less mature pupils than was mass instruction that disregarded individual aptitudes, difficulties, failures, absence from school, and other factors. Furthermore, superiority in one or more of the requisites for learning to read may compensate for deficiencies in others. It has been objectively shown (12), for example, that pupils of higher mental age are able to overcome handicaps and make rapid progress in learning to read much earlier than those who are mentally less mature.

The extent of the general mental development that should precede the introduction of reading has also been widely considered. The results of the earlier studies (10) of this problem showed that pupils with mental ages less than six should not be taught to read. More recently evidence has been secured (9, 26) indicating that a mental age of about six and one-half represents the optimal time for learning to read. However, such conclusions are subject to qualification; for example, Davidson (9) found that bright children can learn to read much more readily than dull children of the same mental age. In fact, bright children with a mental age of four did about as well as the average first-grade pupil. Furthermore, Gates (15) has shown that the age at which pupils can learn to read varies notably with the types of materials and methods used. It follows that many factors other than mental age should be considered when planning initial reading instruction, including the time when reading will be individually most satisfying and socially most fruitful.

A survey of the characteristics, attainments, and needs of children either near the end of the kindergarten or at the beginning of the first grade reveals impressive differences (39); the children exhibit at that time a wide variety of abilities and disabilities, habits, attitudes, interests, and social and emotional characteristics. Their readiness for beginning reading, as typically taught today, differs significantly. It is imperative that teachers study the attainments and needs of their pupils with great care and provide types of training and experience that will result in well-balanced growth on the part of all. Some pupils acquire keen interest in reading and are well prepared for certain types of reading activities much earlier than others. In this connection challenging questions arise: Shall the time at which reading is introduced be varied so that the same general pattern of instruction may be followed

in all cases? Shall the methods and materials be adapted to the varying characteristics and needs of pupils at a given level of school organization? Or, shall some combination of the two procedures be adopted? There is urgent need for additional experimentation to determine the optimal conditions—personal, social, and educational—under which reading should be introduced. Whatever the decision may be, teachers face the responsibility during the prereading period of studying the characteristics and attainments of pupils regularly and of adapting instruction to their varying needs.

2. The Initial Stage in Learning to Read

The initial stage in learning to read, our second stage, represents a significant period in child development. As already indicated, it presupposes certain types of physical, mental, social, and emotional development, the optimal levels of which are still to be determined. The limits of the initial stage in reading have been arbitrarily defined as beginning when guidance in learning to read is first introduced and continuing until the child: (a) has learned to engage in continuous, meaningful reading of simple books, (b) directs his attention with keen interest and absorption to the content, and (c) has acquired interest in independent reading (30, p. 76). Because the child's later development is influenced in large measure by the interests, attitudes, and habits acquired during this initial stage in learning to read, an intelligently planned program of activities and guidance is essential.

In selecting pupils for initial instruction in reading, wide use has been made during recent years of intelligence tests, reading readiness tests, and teachers' judgments (20, 30). The evidence at hand indicates that some combination of these procedures is superior to the use of any one of them alone. However, no plan has been discovered thus far by which it is possible to select strictly homogeneous groups. As a result, the pupils in any classroom who are just beginning to read differ in many significant respects that directly affect their progress, such as brightness, mental age, range of information, ability to associate ideas together in sequence, power of auditory and visual discrimination, range of vocabulary, command of English, and many other abilities and attainments (13). Failure to recognize these differences in the guidance provided in early reading activities often results in maladjustment, discouragement, and wrong attitudes toward reading (8).

A basic principle underlying the teaching of beginning reading is that the materials used should be based on the experiences of pupils

and should be highly charged with interest (30, p. 92). Studies of the dominant interests of children at this stage of development reveal numerous possibilities on which initial reading activities can be based. For example, materials relating to the home, the school, parents, playmates, toys, pets, and numerous intriguing experiences, such as making valentines, going to a grocery store, giving a party, setting a hen (30, p. 82), have been used widely with distinct success. As pointed out earlier, pupils also enjoy rhymes, fairy tales, and fanciful nature and animal stories. Some of the qualities of primary material that contribute most to interest are surprise, liveliness, animalness, conversation, humor, plot (11). Since the interests of children differ radically, it is necessary to provide a reasonably wide variety of reading activities and materials and to adapt the program as often as necessary to variations in the interests and experiences of pupils.

The results of studies of the merits of different procedures in teaching beginning reading are illuminating. Reference has already been made to the fact (15) that a reading program that makes wide use of self-diagnostic materials and that enables the teacher to discover the particular needs of pupils and to make adjustments to them is much more effective than mass instruction that disregards individual aptitudes, deficiencies, and needs. The importance of specific adjustments in teaching procedures is well illustrated in the case of pupils whose vision or hearing is deficient. Furthermore, it has been experimentally shown (16) that a modern systematic method of teaching beginning reading is more effective than an opportunistic method in promoting growth in the fundamental habits involved in reading. Observations showed also that the two methods were about equally effective in developing interest and enthusiasm in reading. Undoubtedly, some systematic instruction supplemented by many informal reading activities is superior to the exclusive use of either method alone.

The rate at which pupils develop in reading is so significant that it merits consideration in this brief report. In a study by Boney and Agnew (2), it was found that first-grade pupils progress in reading at widely different rates and require varying amounts of a teacher's time. This was true also when progress in specific phases of reading was considered. The fact is widely recognized, for example, that some pupils acquire accuracy and independence in word recognition quickly and with little specific guidance, whereas other pupils acquire efficient habits slowly and only as a result of carefully planned guidance extending over a considerable period of time.

The implications of these facts are clear. If instruction is to be effective, it must be adapted to the varying needs of pupils during the initial period in learning to read. In order to achieve this end, several steps are essential (30, pp. 77-78): (1) systematic study of the progress and needs of pupils; (2) a flexible scheme of grouping pupils that recognizes individual differences and provides for them; (3) differentiation in the materials and methods of teaching to provide adequately for differences in capacity and rate of learning; and (4) the provision of periods of effort, uninterrupted by failure or undue discouragement, so that pupils may develop under conditions that will insure steady progress and maintain wholesome attitudes toward school work.

3. The Stage of Rapid Progress in Acquiring Fundamental Reading Attitudes and Habits

By the time pupils are able to read simple books with ease and understanding and begin to read independently with keen interest and absorption in the content, as prescribed in the preceding section, they are prepared for more advanced types of development in reading. "This stage is characterized by rapid progress in the fundamental attitudes, habits, and skills on which clear comprehension and interpretation, speed of silent reading, and fluent accurate oral reading depend" (30, p. 99). Of special significance is the fact that the child now uses reading increasingly in satisfying interests and curiosities, in securing needed information along many lines, and in securing pleasure and hearty enjoyment. Furthermore, the speed of silent reading gradually surpasses that of oral reading, and the habits involved in rapid silent reading and fluent oral reading become clearly differentiated in general pattern. By the end of this stage of development pupils are able to read independently and intelligently, both silently and orally, the various kinds of reading material now commonly used at the beginning of the fourth grade. In terms of traditional school organization the types of development with which we are here concerned normally occur during the second and third grades, although they may be considerably advanced or delayed in the case of individual pupils.

The growing interest and pleasure that children find in reading at this time is of major importance. It not only justifies specific guidance in promoting rapid growth in reading but also provides the motive for wide reading, which is essential to satisfactory progress. An analysis of the interests commonly exhibited during this stage of development

(31, p. 6) justifies four conclusions concerning the nature of the reading activities that are most appropriate: (1) They "should aid pupils in acquiring experiences beyond the limits of the immediate environment and of that afforded by pictures, conversation, and story telling, which were used widely during the earlier stages of development." (2) They should be based on selections and books relating to a wide variety of interests—fairy tales, stories of the actual experiences of children of their own age both here and abroad, realistic animal and nature stories, and stories that offer a simple explanation of the things children see and hear (30). (3) They should utilize the growing interest in real life and in simple explanations through an increasing amount of reading material in the various curricular fields. (4) They should recognize differences in the reading interests of children by including a wide variety of types from which pupils may select for independent reading (31).

Of major importance in organizing a reading program are facts relating to the achievement of pupils in different phases of reading and to the rate at which they learn. Scientific studies (18, p. 4) show conclusively that children at a given age or grade level differ widely in ability in different phases of reading, that they learn at radically different rates, and that they require different kinds and amounts of guidance in order to secure comparable progress. In fact, during the third stage of development children develop more rapidly in basic reading attitudes and habits, and the problems they present change in character more quickly than at any other stage. Some of the factors that contribute to the latter condition are differences in mental age, intelligence quotient, previous experience, cultural background, home influence, interest in reading, and the appropriateness of instruction for individuals (7). In view of these facts it is essential that pupils be organized into groups on the basis of their attainments and needs, that a flexible scheme of class organization be adopted, that books be provided that vary in difficulty according to the reading ability of the children (38), that the progress of pupils in different phases of reading be studied regularly, and that they be regrouped frequently, and provided with individual help, in harmony with their needs (30). When these principles are applied to pupils at any grade level, as pupils are conventionally classified, it is often found that instruction in reading should be provided at two, or even three, of the stages of development outlined in this chapter, and the various levels within each stage.

As a result of numerous experiments (18), it has been found that the methods used in teaching during this period vary widely with the capacity and level of achievement of pupils.

For example, Zirbes (41) organized two sections of second-grade pupils, the members of the one being "matched or paired with those of the other in chronological age, Binet mental age, and reading ability." During the experimental period one group received "carefully planned formal and intensive instruction," while the other was "provided with a wealth of reading material and opportunity for individual choice of materials for silent reading." Although help was given when requested, no systematic group instruction was provided for the latter group. The records secured at the end of the experimental period showed that the average growth in reading was identical for the two groups. However, the upper half of the group that had "extensive individual silent reading experiences showed more improvement or growth than the upper part of the group that had formal instruction." On the other hand, the pupils who ranked in the lower ranges of reading ability did less well through informal, extensive reading than through systematic instruction in reading. A critical review of the data secured in the experiment led to the conclusion that "identical instruction or experience for all pupils, regardless of individual differences in ability, endowment, and interest is unpsychological and indefensible" (41, p. 6).

These outcomes justify the plea for the continuous adaptation of instruction to the interests, needs, and abilities of pupils during the third stage of development in reading, although they do not preclude the possibility of much group instruction. They do imply, however, that such instruction should be supplemented by much individual guidance and that the total program should be constantly modified and adapted to the changing interests, abilities, and needs of pupils.

4. The Stage at Which Experience Is Extended Rapidly and at Which Increased Power, Efficiency, and Excellence in Reading Are Acquired

When children have acquired the reading attitudes and habits that have just been considered, they are prepared to utilize reading more widely in extending experience and satisfying interests. Fortunately, a large majority reach this stage of development in reading at about the time when the broader interests and the inquiring attitudes that characterize the intermediate-grade child begin to emerge. Satisfactory progress during the third stage of development in reading is essential, therefore, if intermediate-grade pupils are to be prepared to utilize reading

as fully and efficiently as the fourth general stage of their development justifies.

Closely associated with the wider opportunity for enriching reading experiences is the need for greater power and efficiency in all reading activities. As pointed out recently by the Yearbook Committee on Reading of this Society (30, p. 108):

This includes, on the one hand, greater accuracy and independence in word recognition, rapid growth in meaning vocabulary, increased clarity in comprehension, greater ability to interpret, increased speed of silent reading adjusted to the purpose at hand, and improved quality of oral reading. It includes, on the other hand, wider familiarity with the sources and values of reading material, greater skill in the use of books and other printed sources of information, and greater efficiency in study activities that involve reading.

In the case of many pupils, two additional problems arise; namely, the need for increasing the range of reading interests and for improving tastes in recreational reading.

Obviously, the first problem that merits consideration in planning a reading program concerns the types of reading materials that are closely related to the interests of children at this level of advancement. Examples of such interests have been referred to earlier. They are considered at length in various reports, such as those of Celestine (6), Lazar (25), Terman and Lima (31), Huber and others (22), and Washburne and Vogel (36). Several conclusions are sufficiently justified by such studies to merit emphasis here: (a) A wide range of material should be provided in order to satisfy the varying interests of pupils. (b) Fiction is the most popular type of material and, if wisely selected, may contribute much toward extending the experiences and broadening the horizon of pupils. (c) Informational material, if well written for children, is also read with great interest (34, p. 180). (d) While poetry does not rank high in the preferences of pupils, it is greatly enjoyed by many if appropriate types of poems are provided and if they are attractively presented (22). (e) Relatively simple material is read with greater enthusiasm than difficult material, though many pupils will exert themselves to read material beyond their level of difficulty if they are genuinely interested in the content. (f) The attractiveness of the cover, the format of the page, and the preferences of the teacher (18) influence the choices of pupils.

Among the types of development that should occur during this

period, growth in concepts and in meaning vocabulary is of major importance. Thorndike (32) has presented evidence that the intermediate grades offer unlimited possibilities for the acquisition of experience and the enrichment of meaning vocabulary. Hilliard (21) found that, next to intelligence, meaning vocabulary correlates more highly with comprehension than any other factor. A recent summary (19) of the results of related studies led to the conclusion that vocabulary growth is closely associated with such factors as "intelligence, the nature of the instruction given, experience and cultural influences, economic status, and interest." Other factors referred to in the literature are "foreign parentage," "geographical distribution," "the quality rather than the quantity of reading," "knowledge of parts of speech," and "the content in which a word appears." Furthermore, experiments show that the context is one of the most significant aids in the acquisition of meaning and that direct methods of teaching meanings are far more effective than incidental procedures (19).

A third significant problem relates to speed of reading. That the ability, interests, and needs of the learner must be considered in promoting growth is clearly supported by scientific evidence (18, pp. 122-147). Experience teaches that pupils with visual handicaps are commonly unable to read with the speed or the comfort of pupils with normal vision. Experiments show clearly that ability to learn, as measured by intelligence tests, is a vital factor in speed of reading. Traxler (33) has shown that the reaction time of the learner in an association test correlates highly with speed of reading. These findings harmonize with the view of earlier investigators to the effect that speed of reading is determined primarily by the speed with which ideas are interpreted in the brain rather than by the amount of time required to secure and transmit visual impressions to the brain centers. The fact has also been demonstrated that speed of reading is determined in part by the child's interest in the content of what is read and by his eagerness to secure the information presented or to follow the story. The lesson these facts teach is that teachers should study the characteristics of their pupils and the conditions under which speed of reading can be increased most effectively, and plan instruction accordingly. Similar statements can be made with respect to practically all important phases of reading.

Emphasis may be laid upon variations in the progress of pupils in reading at this level of development (30, p. 332). As a result of wide differences in the attainments and needs of pupils in reading, a flexible program of basic instruction in reading is essential. Some pupils reach

maturity in most, or all, phases of reading much earlier than others. It follows that during the intermediate grades much more time should be reserved for basic instruction in reading for some pupils than for others, keeping in mind the fact that all pupils profit from much guidance in reading activities that enrich experience, cultivate ideals and appropriate attitudes, and broaden interests. Of course, the reading materials provided should correspond in difficulty to the reading ability of the pupils. Following many years of intensive study of the grade placement of children's books, Washburne and Morphett (35, p. 364) concluded: "Children cannot be expected to learn from books which are so written that the mechanical difficulty of reading them occupies the center of the children's attention. It is only by giving children plenty of reading at their own level of ability that fluency and a real love of reading can be developed."

Many graded book lists are available, most of them, however, graded on the basis of personal judgment. Two graded lists have been published on the basis of children's free choice reading (31, 36). More recently, some 1700 titles have been selected by a committee of the American Library Association as the best books for children's libraries. These have been graded by a statistical analysis of their vocabulary and sentence structure (38). Through the use of such a graded book list, a teacher can readily make available to children a wide selection of books well within the range of a given reading ability.

5. The Stage at Which Reading Interests, Habits, and Tastes Are Refined

By the time pupils enter the junior high school, most of them have nearly matured in the fundamental attitudes and habits involved in both oral and silent reading. They have made notable progress in apprehending and interpreting meaning and in reading for different purposes. They have acquired strong motives for reading and keen interest in a reasonably wide range of reading materials, and have acquired numerous habits and skills essential in the effective use of books, libraries, and other sources of information. By virtue of such attainments junior-high-school pupils enter a period in which reading interests, habits, and tastes should be rapidly extended, refined, and perfected. This demand arises as the child enters adolescence, with all its physical, mental, social, and emotional developments.

A significant fact about the junior-high-school period is that emphasis upon conscious learning is now appropriate. As pointed out by

the National Committee on Reading in 1925, growth in ability to read begins in the primary grades "by unconscious imitation of the teacher and by following her directions. In the fourth, fifth, and sixth grades, the habits thus initiated are further developed through wise direction and supervision. In the junior and senior high schools, skillful direction is continued and supplemented by simple explanation of reading processes, deliberate study by the pupils of their own habits, and further extensive practice to secure improvement." It follows that a reasonably intensive study may now be undertaken by the pupils of the nature of their attainments, the causes of deficiency, if any, and the types of progress that should be made in becoming proficient in all important reading and study activities.

Certain facts concerning the mental development of children at this stage merit consideration. As a result of summaries of evidence concerning mental growth during adolescence, various writers, including Brooks, Cole, Arlett, and Hollingworth (27, p. 845) agree on two significant conclusions: (1) that mental growth as measured by mental tests continues on the average until the later teens; and (2) that "although intelligence grows during adolescence, the rate of its growth decreases steadily" (3, p. 99). Of special significance is the fact that notable improvement occurs in ability to think logically, to draw conclusions, and to sense implications. These findings indicate that strong emphasis can be given advantageously to stimulating growth in ability to interpret meaning, to evaluate critically what is read, and to engage in problem-solving while reading. The fact, too, that the secondary-school period is one of great plasticity, or modifiability, suggests in turn that intensive efforts to extend and refine interests, attitudes, tastes, and habits will be very productive. One implication of decreasing rate of mental growth is that young people should attain satisfactory reading habits and interests while they are still able to acquire new interests and habits and to increase their efficiency with reasonable ease.

Reference is made in various chapters of this Yearbook to the need for growth in the understanding of language as a medium for the communication of ideas. This need is particularly urgent at the secondary-school level because of the increasingly mature forms in which ideas are expressed on the printed page. Classroom experience shows clearly that pupils are often thwarted in their effort to apprehend meaning because of the form in which ideas are expressed. Among the understandings that should be emphasized vigorously in the upper grades and in

secondary schools are: functional relationships within sentences and paragraphs; figures of speech and their significance in interpretation; the 'emotive' charge of the language used; and 'shifts' in meaning (40). Much research is needed to determine the specific types of understandings in the field of language that are essential in the interpretation of meaning and the methods by which they can be developed most effectively.

The final problem to be considered concerns the interests and tastes in reading of secondary-school pupils. During the last two decades, notable progress has been made in increasing the percentage of pupils who engage in independent reading. During the next decade, major emphasis should be directed to the elevation of standards and tastes in reading (30, p. 20). The need for a concentrated attack on this problem is particularly urgent at the secondary-school level where the interests exhibited are often very unsatisfactory (29) by any reasonable standard that may be applied. Teachers who are directing pupils at this stage of development should secure much encouragement from the fact that reading interests and tastes are subject to notable improvement through careful guidance in reading, through critical studies of the merits of different types of material, and through the inspiration and leadership of one who enjoys good reading.

BIBLIOGRAPHY

- (1) BETTS, EMMETT A. *The Prevention and Correction of Reading Difficulties*. (Evanston: Row Peterson and Company, 1936. 402 pp.)
- (2) BONEY, C. DEWITT, and AGNEW, KATE. "Periods of awakening or reading readiness." *Elementary English Review*, 14: May, 1937, 183-187.
- (3) BROOKS, F. D. *Psychology of Adolescence*. (Boston: Houghton Mifflin Company, 1929)
- (4) BUSWELL, GUY T. *An Experimental Study of the Eye-Voice Span in Reading*. (Chicago: Department of Education, University of Chicago, Supplementary Educational Monographs, No. 17, 1917)
- (5) BUSWELL, GUY T. *Fundamental Reading Habits: A Study of Their Development*. (Chicago: Department of Education, University of Chicago, Supplementary Educational Monographs, No. 21, 1922)
- (6) CELESTINE, SISTER M. *A Survey of the Literature on the Reading Interests of Children of the Elementary Grades*. (Washington: Catholic Education Press, Catholic University of America, Educational Research Bulletins, Vol. V, Nos. 2 and 3, 1930)
- (7) COLE, LUILLA. *The Improvement of Reading*. (New York: Farrar and Rinehart, 1938)
- (8) CUTRIGHT, PRUDENCE, and ANDERSON, WALTER A. *An Experimental Study of*

Pupil Failures in the First Grade. (Minneapolis: Minneapolis Public Schools, Curriculum Department, 1934)

(9) DAVIDSON, HELEN P. "Experimental study of bright, dull, and average children at the four-year mental level." *Genetic Psychology Monographs*, 9. March-April, 1931, 119-289.

(10) DICKSON, VIRGIL E. "What first-grade children can do in school as related to what is shown by mental tests." *Jour. of Educ. Research*, 2. June, 1920, 475-480.

(11) DUNN, FANNIE W. *Interest Factors in Primary Reading Material.* (New York: Teachers College, Columbia University, Teachers College Contributions to Education, No. 113, 1921)

(12) ENGEL, ANNA M. "Characteristic and significant differences between X and Z pupils in the Detroit public schools." *Elem. Sch. Jour.*, 24: June, 1924, 747-755.

(13) FALK, ETHEL MABIE (Chairman). *A Coöperative Study of Reading Readiness.* (Madison, Wisconsin: Madison Public Schools, 1937)

(14) FRIEDMAN, KOPPLE C., and NEMZEK, CLAUDE L. "A survey of reading interest studies." *Education*, 57: September, 1936, 51-56.

(15) GATES, ARTHUR I. "The necessary mental age for beginning reading" *Elementary School Journal*, 37: March, 1937, 497-508.

(16) GATES, ARTHUR I. (assisted by MILDRED L. BATCHELDER and JEAN BETZNER) "A modern systematic versus an opportunistic method." *Teachers College Record*, 27: April, 1926, 679-700.

(17) GATES, ARTHUR I., and BOND, GUY L. "Reading readiness: A study of factors determining success and failure in beginning reading." *Teachers College Record*, 37: May, 1936, 679-685

(18) GRAY, WILLIAM S. *Summary of Investigations Relating to Reading.* (Chicago: University of Chicago, Supplementary Educational Monographs, No 28, 1925)

(19) GRAY, WILLIAM S., and HOLMES, ELEANOR. *The Development of Meaning Vocabularies in Reading: An Experimental Study* (Publications of the Laboratory Schools of the University of Chicago, No. 6, February, 1938)

(20) HARRISON, LUCILE *Reading Readiness* (Boston: Houghton Mifflin Company, 1936)

(21) HILLIARD, GEORGE HORATIO. *Probable Types of Difficulty Underlying Low Scores in Comprehension Tests.* (Iowa City: University of Iowa Studies in Education, Vol. II, No 6, 1924)

(22) HUBER, MIRIAM BLANTON; BRUNER, HERBERT B.; and CURRY, CHARLES MADISON. *Children's Interests in Poetry.* (New York: Rand, McNally and Company, 1927)

(23) JUDD, CHARLES H. "Studies in Grade Placement" *Fourteenth Annual Conference on Educational Measurements.* (Bloomington: Indiana University, Bulletin of the School of Education, Indiana University, Vol. III, No. 6, July, 1926, 34-41)

(24) LABRANT, LOU L. *An Evaluation of Free Reading in Grades Ten, Eleven, and Twelve.* (Columbus: Ohio State University Press, Ohio State University Studies, Contributions to Education, No. 2, 1936)

- (25) LAZAR, MAY. *Reading Interests, Activities, and Opportunities of Bright, Average, and Dull Children*. (Teachers College, Contributions to Education, No 707, 1937)
- (26) MORPHETT, MABEL VOGEL, and WASHBURNE, CARLETON. "When should children begin to read?" *Elem. Sch. Jour.*, 31 March, 1931, 496-503
- (27) MURCHISON, C (Editor). *Handbook of Child Psychology*. (Worcester, Massachusetts: Clark University Press, 1933)
- (28) PERSONS, GLADYS L. (Chairman). *Survey of Reading in Typical High Schools of New York City*. (New York: Noble and Noble, Yearbook No. 1, The New York City Association of Teachers of English, 1936)
- (29) RASCHE, WILLIAM FRANK. *The Reading Interests of Young Workers*. (Privately printed Distributed by the University of Chicago Libraries, 1937)
- (30) "The Teaching of Reading: A Second Report." (*Thirty-Sixth Yearbook, Part I*, of this Society, 1937)
- (31) TERMAN, LEWIS M., and LIMA, MARGARET. *Children's Reading*. (New York: D. Appleton-Century Company, 1926)
- (32) THORNDIKE, EDWARD L. "Improving the ability to read" *Teachers College Record*, 36: October, November, and December, 1934, 1-19, 123-144, 229-241.
- (33) TRAXLER, ARTHUR E. "The relation between rate of reading and speed of association." *Jour. of Educ. Psychol.*, 25 May, 1934, 357-365.
- (34) UHL, WILLIS L. *The Materials of Reading* (New York: Silver, Burdett and Company, 1924)
- (35) WASHBURNE, CARLETON, and MORPHETT, MABEL VOGEL. "Grade placement of children's books." *Elem. Sch. Jour.*, 33 January, 1933, 355-364
- (36) WASHBURNE, CARLETON, and VOGEL, MABEL. "What children like to read." *Winnetka Graded Book List*. (Chicago: Rand, McNally and Company, 1926)
- (37) WATERS, DORIS. "Prereading experiences." *Education*, 54: January, 1934, 308-312.
- (38) WILKINSON, MARY S; WEEDON, VIVIAN; and WASHBURNE, CARLETON. *The Right Book for the Right Child*. (New York: The John Day Company, 1933)
- (39) WILSON, FRANK T., and BURKE, AGNES. "Reading readiness in a progressive school." *Teachers College Record*, 38: April, 1937, 565-580.
- (40) ZAHNER, LOUIS C. "Reading and interpretation." *Groton School Quarterly*, 11: December, 1937, 6-14
- (41) ZIRBES, LAURA. *Practice Exercises and Checks on Silent Reading in the Primary Grades*. (New York: The Lincoln School of Teachers College, 1925)

CHAPTER X

THE DEVELOPMENT OF SPOKEN LANGUAGE

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The amount of research on the development of spoken language is so great that it is impossible within a brief space to give an adequate or detailed summary of it. There are at least twenty-five major summaries or bibliographies, each of which integrates the results of a large number of specific studies. The most recent and complete of these is that by McCarthy in the Murchison Handbook (27). Although it does not pretend to cover all studies, it lists 236 in its bibliography. The following summary, then, is exceedingly compact and can make reference to only a few studies.

I. THE GENERAL DEVELOPMENT OF VOCALIZATION

From the moment of birth, with its characteristic cry, vocal expressions are a part of the child's general system of responses. Sounds are made as naturally as are movements of the arms and legs. During the first thirty days of the infant's life, Blanton (5) found there are variations from child to child in the sounds made, and differences in timber, pitch, and pattern in the cries of the same infant. Blanton (5), McCarthy (29), Shirley (40), and other investigators agree that the first utterances are vowels of some sort, that *m* is the first consonant the child uses, and that by the age of from four to six months all the vowel and consonant sounds have spontaneously appeared, including many that can be classified in the phonetic notation of the familiar languages only with difficulty.

As time passes, the reflex sounds of infancy become what Watson (52) calls "vocal habits"; *i.e.*, patterns of sound, involving both syllabic speech and much syllabic repetition. These sounds have the form of words, without, however, any meaning. This syllabic repetition is sometimes spoken of as 'the babbling stage,' and appears between six and ten months.

Shirley (40), in her longitudinal study of infants from birth until the emergence of true speech, notes in order of their appearance the following sequences: (1) vocal grunts of a reflex character, (2) syllabic vocalization or vocal play, (3) socialized vocalization, such as babbling to a person and shouting for attention, (4) expressive tones and inflections, (5) comprehensible words, (6) use of pronouns, (7) use of phrases and sentences.

Between the eighth and the seventeenth months the first word appears. The criterion for the appearance of words is the use of the sound as a substitute for other activity; that is to say, the vocal habit becomes a language habit when the sound becomes a symbol or a substitute for activities or experiences. All investigators agree that the determination of the age at which the first word appears is very difficult. Bateman (4) finds it occurring most frequently at ten months and Shirley (40) gives the median age of its appearance in the presence of an examiner at 60 weeks. The mothers in the Shirley study reported that their children used two or three words meaningfully at the age of twelve months.

After the first word appears, new words are added very slowly for a period of approximately six months (31). Somewhere between the eighteenth and the twenty-fourth months, the child passes into a period of language called by Stern (45) the "naming stage," which is characterized by a rapid increase in the rate of vocabulary acquisition. Markey (26), utilizing vocabularies from the literature, made an analysis of these increments for individual children, obtaining curves that differ markedly from those obtained by plotting the means of a group of children.

The development of language proceeds in two ways: first, by the slow addition of new responses by a conditioning process and, second, by moving from a more general to a more specific and precise characterization through an active search for symbols. Because many of the early words used by the child carry the meaning of sentences, they are sometimes called 'one-word sentences.' Later, groups of words come to carry the same meaning, and further development proceeds both by differentiation and by the more precise attachment of specific sounds to experiences and objects.

Preceding and paralleling the active use of words, the child develops the capacity to react to words used by others. Before he utters a single word or sign to convey meaning, he reacts differentially to sounds. Throughout the development of language, comprehension

seems to outrun the ability to use the spoken word and gives rise to a distinction between the vocabulary of understanding and the vocabulary of use.

II. THE DEVELOPMENT OF VOCABULARY

The most adequate vocabulary norms available for young children are those of Smith (43), who developed a special test on the basis of the Thorndike list of common words, and recorded the vocabularies of children by eliciting language responses through objects, pictures, actions, and questions. Her age table follows:

<i>Age</i>	<i>Number of Words</i>	<i>Increments</i>
1 year	3	
1½ years	22	19
2 "	272	250
2½ "	446	174
3 "	896	450
3½ "	1222	326
4 "	1540	318
4½ "	1870	330
5 "	2072	202
5½ "	2289	217
6 "	2562	273

Generalizing the increments, we may say that during the first year the child acquires three words, during the second year, 269 words; from then on to the fourth year, very close to 600 new words each year, after which the rate slows to 500 a year up to the age of six.

The size of vocabulary continues to increase during later childhood and adolescence. Measures and estimates of the size of vocabulary for the later ages vary greatly depending upon the measures used. The method of sampling words from the dictionary measures the vocabulary of understanding rather than of use; the method of free association furnishes an indirect measure of use; the method of analyzing children's compositions and letters measures the vocabulary of writing, which may be quite different from that of speech. Kirkpatrick's (23) and Brandenburg's (8) estimates indicate the average vocabulary of a senior in the high school (18 years) to be between 15,000 and 18,000 words, figures that exceed those given by Terman (47).

Studies by Gale and Gale (17), Brandenburg (9), and Nice (32), record the total language responses of the child during a single day. For the two-year-olds studied by Gale, the total number of words used in a day varied from 4,275 to 10,507, with approximately 50 percent of the child's total vocabulary being put to use. In the Brandenburg in-

vestigation, a three-year-old child used 11,623 words during the day, and the four-year-old child 14,930; the three-year-old child used 37 percent, and the four-year-old child 23 percent of his total vocabulary. The three-year-old asked 376 questions and the four-year-old 397 questions during the day. The total length of time a child was linguistically inactive was nineteen minutes, and the longest single period of linguistic inactivity was four minutes. These figures show the tremendous amount of practice the child gets in language during the day. If these figures are multiplied by 365 (days in the year), and then by three or four (years), we obtain totals in the millions, which reveal the amazing amount of practice in linguistic responses the child has before he enters school and go far to explain the smooth-running and automatic character of many of his linguistic responses before tuition is received.

TABLE I.—MEAN NUMBER OF DIFFERENT WORDS USED IN FIFTY REMARKS AT AGES 2 TO 9½

(As reported in studies by Day, McCarthy, and Davis)

Age in Years	Investigator	Singletons	Twins	Only Children
2	Day, McCarthy	29.1	20.4	—
3	" "	62.8	45.3	—
4	" "	92.6	56.5	—
5	" "	—	65.3	—
5½	Davis	93.9	88.5	103.8
6½	"	108.2	108.1	110.5
9½	"	126.3	114.0	138.7

Three extensive investigations using comparable techniques have been conducted by McCarthy (28), Day (11), and Davis (10). In these studies fifty consecutive remarks were recorded for each child on samples of children that were rigorously selected to match the general population in terms of Minnesota occupational classification. If the mean number of different words occurring during the fifty remarks is obtained, we have a measure of vocabulary development extending from two to nine and a half years. Table I, drawn from Davis (10), gives these figures.

III. THE DEVELOPMENT OF PARTS OF SPEECH

Three extensive analyses of development in the use of parts of speech by large numbers of young children have been made, one by

Smith (43), who used spontaneous conversations of an hour each; one by McCarthy (28), who recorded fifty consecutive responses; and one by Day (11), who studied twins. There are also many reports on a single child or on a few children. The results obtained in all these studies show high agreement. If we analyze the use of parts of speech on the basis of all the words used, including repetitions, at two years there is a high proportion of nouns (50-60 percent), while if the different words (excluding repetitions) are considered, the proportions are similar to those at later ages. Aside from this excessive use of the same nouns in the two-year-old, studies of parts of speech show that all phases of language development proceed at a fairly uniform rate. This indicates that language is learned by wholes, rather than by isolated

TABLE II.—MEAN NUMBER OF WORDS PER RESPONSE BY CHRONOLOGICAL AGE (SEXES COMBINED)

(From studies by McCarthy, Smith, Day, and Davis)

Years	McCarthy	Smith	Day	Davis		
				Twins	Singletons	Twins Only Children
1½	1.2	—	—			
2	1.8	1.7	1.5			
2½	3.1	2.4	—			
3	3.4	3.3	2.5			
3½	4.3	4.0	—			
4	4.4	4.3	3.0			
4½	4.6	4.7	—			
5	—	4.6	3.2			
5½				4.6	4.4	5.1
6½				5.3	5.4	5.4
9½				6.5	6.2	7.3

and individual responses, and that the relative proportion of parts of speech is fixed by one general language pattern.

IV. DEVELOPMENT IN THE LENGTH AND STRUCTURE OF SENTENCES

The first appearance of the sentence is reported, in the biographical studies summarized in the *Twenty-Eighth Yearbook* of this Society (37), from the fifteenth to the twenty-eighth month. Nice (33) reports the average age of the appearance of the first sentence for twenty children at 17.5 months.

In the Smith (43), McCarthy (28), Day (11), and Davis (10) studies of responses the mean number of words between pauses, or stops, was recorded. Table II assembles the results from these studies.

It is clear that with increasing age there is a steady increase in the length of response. The Fisher (16) study, done on a group of gifted young children, shows similar age trends, but higher mean figures.

At the age of eighteen months simple sentences consisting of a noun and a verb have put in their appearance; these are followed somewhat later by simple sentences with a single phrase; then by more complex sentences and compound sentences. Up to the age of four and a half years, complex and compound sentences constitute only a small proportion of the total number. Nevertheless, it is worthy of note that virtually every form of sentence structure has been employed by the age of five or six years. Boyd's studies (6, 7) suggest that the mature form of sentence (in spoken language) is achieved in the early school years. With reference to the type of sentence, in the earlier years there are many declarative sentences — which are more frequent than any other at all ages — and many imperative sentences. Questions increase with age during the preschool period.

On the basis of her study, Smith (43) concludes that "the most significant trend in the development of the sentence with increase in age was an increasing tendency toward the use of longer and more complete sentences . . . and a decrease with age in the proportion of simple sentences to complex and compound sentences."

Nice (33) outlines the various stages in sentence formation as follows: (a) A single-word stage up to twelve months. (b) An early sentence stage from thirteen to twenty-seven months with an average at seventeen and one-half months. This stage lasts from four to seven months and is characterized by a preponderance of nouns, lack of articles, auxiliaries, and copulative verbs, prepositions and conjunctions. (c) A short-sentence stage consisting of sentences of from 3.5 to 4.5 words in length that possesses the characteristics of the preceding stage in a lesser degree. Inflections are not yet mastered and only one or two sentences out of fifty are compound or complex. (d) A complete-sentence stage that appears at about four years and consists of sentences of from six to eight words characterized by greater definiteness and complexity, as shown by an increased use of relational words. At this stage the inflections have been practically mastered and the majority of sentences are complete.

The most extensive study of the relation between sentence structure in *written* language to age was made by LaBrant (24), who used as a measure an Index of Subordination, obtained by dividing the total number of subordinate clauses by the total number of clauses.¹ Davis

¹ For a fuller discussion of this study, see Chapter XI. — *Chairman.*

(10) found some difficulty in adapting the LaBrant technique to spoken language because of the large number of one word and fragmentary remarks that occur in speech. Hence, the index of subordination for spoken language is lower than that for written language at comparable ages. The Davis figures for the mean index of subordination are: 5½ years, 10; 6½ years, 12; 9½ years, 17. From her extensive analysis of various types of clauses, Davis found that adjectival clauses are the least frequent, and that the number of noun clauses decreases in the early school years, while the number of adverbial clauses increases. She also presents data on the use of the infinitive and of auxiliary verbs, and on the frequency and type of grammatical errors.

V. THE FUNCTION OF LANGUAGE

Piaget (36) presents an interesting classification of the functions of the child's language in relation to thought. He divides language into ego-centric speech and socialized speech, and finds in two children six and one-half years of age that the ego-centric speech (consisting of repetitions, monologues, and dual or collective monologues) constitutes approximately 38 percent of the total speech of the child. McCarthy (28) found a much smaller proportion of ego-centric responses, approximately four percent between the ages of eighteen and fifty-four months, with a tendency to decrease in the later years. Whether this discrepancy is due to a sampling error in the Piaget data, or to a difference between the social background of French and of American children, or to a difference in the method of collecting data, remains to be determined. Other investigators, Day (11), Davis (10), and Johnson and Josey (22), support McCarthy. Fisher (16), who studied gifted children and found 34 percent ego-centric remarks in preschool children, defines ego-centric differently from either Piaget or McCarthy. In any event, the Piaget analysis offers a most interesting possibility of studying language development in a way somewhat different from that which is possible through the analysis of its formal structure. Attention should also be called to Piaget's analyses of the language and thought of the child (34, 35, 36) and to Deutsche's (14) checking of some of his generalizations on a group of American school children covering a wide age range.

VI. ARTICULATION

Very few studies of the developmental relationship of articulation have been made. A number of studies, by Tracy (50), Major (25), Remer (39), Morrison (30), and Town (48), suggest the existence of an age relationship. Wellman and her associates (53) studied the speech

sounds of 204 children from two to six years old and found a gradual improvement in articulation with age. By the age of five from 87 to 90 percent of the various speech elements were given correctly. Girls tend to be superior to boys.

The most extensive investigation of a carefully selected sample of singletons, twins, and only children is that by Davis (10), who studied groups of children averaging 5½, 6½, and 9½ years. Table III gives her findings.

TABLE III.—PERCENT OF CHILDREN WITH PERFECT ARTICULATION (DAVIS)

Age	Singletons	Twins	Only Children	Socio-Economic Status		Sex	
				Upper Group	Lower Group	Boys	Girls
5½	76	49	79	73	58	56	73
9½	90	87	100	93	89	87	95

Obviously, there is shown a marked improvement in articulation from 5½ to 9½ years. 'Only children' articulate better than singletons with siblings, who in turn articulate better than twins at each age level. Children from the upper socio-economic groups articulate better than children from the lower ones, and girls articulate better than boys at each age level. These are essentially the same relations that Davis found for language content, except that the retardation of twins with respect to articulation seems to be proportionately greater at the age of 9½ years than it is with respect to language content. Sommers (44) found twice as great improvement in an experimental group of young children given speech training as in a matched control group not given such training. But the control group also showed great improvement.

VII. THE EXTRINSIC RELATIONS OF SPEECH

So far we have been concerned with the intrinsic character of spoken language. A number of studies have been undertaken to determine the extrinsic relationships. These may be summarized under the following heads:

1. Intelligence

Language development is also intimately associated with the growth of intelligence. Almost every intelligence test that covers any considerable age range includes many items and tests that are either

direct measures of language development or else are so closely related to linguistic development as to constitute indirect measures of it. One need only point to the vocabulary test in the Stanford-Binet as an instance, or the opposite tests that find their way in some form or another into almost every group test. Smith (43), McCarthy (28), Day (11), Davis (10), and LaBrant (24), to mention but a few investigators, find a fairly close relation between language and mental age. Studies of language development among the feeble-minded have uniformly shown evidence of great retardation (49), while studies of gifted children have shown corresponding acceleration (46).

2. Motor Ability

The evidence on the relation between language development and motor development is conflicting. No comprehensive study over a wide age range has been undertaken. The evidence that is available suggests a relation in the early years and an absence of, or a very low, relation in the later years.

3. Sex

The relation to sex is not quite clear in the published data. Terman (46) found earlier development among girls. Smith (43) finds no relation to sex. McCarthy (28), Day (11), Davis (10), however, in the series of investigations that most completely balance the groups throughout the entire age range with respect to sex and paternal occupation, obtain, in every age group between eighteen and fifty-four months and for every category of language development, consistent evidence of slight superiority of girls over boys with respect to both language content and articulation.

4. Socio-Economic Status

A number of investigations have been concerned with the relation of language development to socio-economic status, occupational class, cultural level, and the like — a relation suggested in many of the earlier studies. Among the recent workers, Descoeuadres (13) in France, Drever (15) in England, Gesell and Lord (19), Smith (43), McCarthy (28), Day (11), and Davis (10) in the United States, and Hetzer and Reindorf (21) in Austria, all have obtained results that agree in showing a positive relation between linguistic development and socio-economic status. Stern (45), reworking the Descoeuadres data on children of the educated and the working classes, concludes that the difference

is approximately equivalent to eight months in age. Hetzer and Reindorf, comparing professional class and laboring class children, find retardation in extent of vocabulary from nine to twelve months, sentence usage four months, first employment of inflection four months, and, in the use of different parts of speech, six months. Smith (43) and McCarthy (28), who developed techniques for comparing the effect of social status while mental age was kept constant, found that the relation still held, though in smaller degree.

5. Singletons, Twins, Only Children, and Influence by Associates

The studies of Day (11) and Davis (10), to which reference has already been made, show a measurable superiority of singletons over twins. The retardation of twins is very slight at one and one-half years, increases up to five years, then begins to decrease, and is slight again at nine and one-half years. Apparently the twin status affects language adversely in the preschool years. This adverse effect is corrected in large part by the early school experience of the child. The retardation in articulation is more lasting than the retardation in language content.

The only children studied by Davis (10) showed distinct superiority at all age levels. The whole group of investigations upon social status, and the results obtained by Day and Davis point to the existence of very marked environmental effects upon language processes, in both the preschool and the early school periods.

6. Bilingualism

A number of investigations have been made on bilingualism, of which the most recent are those by Smith (42) and Arsenian (1). In general, the evidence supports the principle that bilingualism during the early years is a handicap so far as advancement in either language is concerned, but if both languages are considered together, the bilinguals are equal to, or slightly superior to, the monoglots.

7. Related Studies

Related in a general way to these language studies, but dealing specifically with the question of the range of information among kindergarten children, a study made by Probst (38) reveals interesting sex and socio-economic differences that should be studied over a wider age range. Her technique was a modification of that used by Hall (20)

and consisted of questions divided into eleven categories, such as time and number, natural phenomena, household objects, and so forth. Boys were superior to girls in the range of information within every category, and the upper socio-economic groups were superior to the lower within every category.

Various studies have been made of the development of certain special aspects of the general problem of linguistic development. Without going into detail, it may be pointed out that color names increase in relation to age (3) from 2.5 per child at two years to 7 at six years. The time required to name colors also decreases with age. The development of the concept of number shows a similar relation to age. Baldwin and Stecher (2), asking children to count without reference to objects, found the average highest number reached without error was 1 at two years, 3.4 at three years, 10.6 at four years, 23.7 at five years, and 25.3 at six years. Correct counting of objects is more difficult; no evidence of the ability is obtained at two years; while the average number correctly counted is 3.1 at three years, 9.2 at four years, 21.3 at five years, and 27.6 at six years. Descoedres (12) offered children choices between numbers of objects and objects varying in color or form with number constant, and found that choice on the basis of number increased with age while that on the basis of form decreased. She concludes that, as age increases, the number becomes increasingly important as compared with form and color. Waring (51) studied the relation between language and conduct control, finding that language approval enables the child to generalize his concept of success and therefore acts as a useful factor in conduct control.

VIII. CONCLUSION

The impression one gains from even a cursory survey of the tremendous literature on the development of spoken language is that of a fundamental process which puts in its appearance between one year and one and one-half years and develops with great speed during the preschool and early school period. Before the child receives any tuition from the school, the spoken language, which is in many respects the outstanding educational achievement of his life, is well on its way towards its maximal development. Although the linguistic level reached is influenced by many factors, there is clear evidence that a linguistic environment of a high level that effectively stimulates the speech of the child is to be desired. How to obtain it is another question. Perhaps if we paid somewhat more attention to the education

of the young child, we should simplify many of the problems that rise to perplex us in the school period and so facilitate the entire educational process.

BIBLIOGRAPHY

- (1) ARSENIAN, S. *Bilingualism and Mental Development*. (New York: Teachers College, Columbia University, 1937 164 pp)
- (2) BALDWIN, B. T., and STECHER, L. I. *The Psychology of the Preschool Child*. (New York. D. Appleton-Century Co., 1925. 305 pp.)
- (3) BATEMAN, W. G. "The naming of colors by children." *Ped. Sem.*, 22: 1915, 467-486.
- (4) BATEMAN, W. G. "Papers on language development I. The first word." *Ped. Sem.*, 24: 1917, 391-398
- (5) BLANTON, MARGARET G. "The behavior of the human infant during the first thirty days of life" *Psych. Review*, 24 1917, 456-483
- (6) BOYD, W. "The beginning of syntactical speech. A study in child linguistics." *Child Study*, 6: 1913, 47-51.
- (7) BOYD, W. "The development of sentence structure in childhood." *British Jour. of Psychol.*, 17 1926-27, 181-191.
- (8) BRANDENBURG, JULIA, and BRANDENBURG, G. C. "Language development during the fourth year" *Ped. Sem.*, 26: 1919, 27-40
- (9) BRANDENBURG, G. C. "Psychological aspects of language." *Jour. Educ. Psychol.*, 9. 1918, 313-332.
- (10) DAVIS, EDITH A. *The Development of Linguistic Skill in Twins, Singletons with Siblings, and Only Children* (Institute of Child Welfare Monographs No. 14, Univ. of Minnesota Press: Minneapolis, 1937 165 pp)
- (11) DAY, ELLA J. "The development of language in twins" *Child Development*, 3: 1932, 179-199, 298-316.
- (12) DESCŒUDRES, ALICE. "Couleur, forme, ou nombre?" *Arch. de Psychol.*, 14: 1914, 305-341
- (13) DESCŒUDRES, ALICE. *Le Développement de l'Enfant de Deux à Sept Ans*. (Paris: Delachaux and Niestle, 1921 322 pp.)
- (14) DEUTSCHE, JEAN MARQUIS. *The Development of Children's Concepts of Causal Relations*. (Institute of Child Welfare Monograph No. 13, Univ. of Minnesota Press, 1937. 120 pp.)
- (15) DREVER, JAMES, JR. "A study of children's vocabularies" *Jour. Exper. Ped.*, 3 1915-16, 34-43, 96-103, 182-188
- (16) FISHER, M. S. "Language patterns of preschool children." *Jour. of Exper. Educ.*, 1: 1932, 70-85
- (17) GALE, H., and GALE, M. C. "Vocabularies of Three Children of One Family to Two and One-Half Years of Age." *Psychol. Studies, Univ. of Minnesota*, 1: 1900, 70-117
- (18) GESELL, ARNOLD *Mental Growth of the Preschool Child*. (New York: The Macmillan Company, 1925. 447 pp.)
- (19) GESELL, A., and LORD, E. "A psychological comparison of nursery-school children from homes of low and high economic status." *Ped. Sem.*, 34: 1927, 339-356

(20) HALL, G STANLEY. *Aspects of Child Life and Education*. (New York: D. Appleton-Century Co., 1921 326 pp.)

(21) HETZER, H., and REINDORF, B. "Sprachentwicklung and Soziales Miheu." *Zsch. f. Angew. Psychol.*, 29: 1928, 447-462.

(22) JOHNSON, E. C., and JOSEY, C. C. "A note on the development of the thought forms of children as described by Piaget." *Jour. Abnor. and Soc. Psychol.*, 26 1931, 338-339.

(23) KIRKPATRICK, E A. *Fundamentals of Child Study*. (New York: The Macmillan Company, 4th ed 1929. 410 pp.)

(24) LABRANT, L. "A study of certain language developments of children in grades four to twelve inclusive" *Genetic Psychology Monographs*, 14: 1933, 387-491

(25) MAJOR, D R. *First Steps in Mental Growth: A Series of Studies in the Psychology of Infancy*. (New York: The Macmillan Co., 1906. 360 pp.)

(26) MARKEY, JOHN F. *The Symbolic Process and Its Integration in Children*. (New York: Harcourt, Brace and Co., 1928 192 pp.)

(27) McCARTHY, DOROTHEA. "Language development." (In *Handbook of Child Psychology*, Worcester, Mass.: Clark University Press 1933, 2d ed., 329-373)

(28) McCARTHY, DOROTHEA. *Language Development of the Preschool Child*. (University of Minnesota Institute of Child Welfare Monograph, 1930, No. 4, 1930 174 pp.)

(29) McCARTHY, DOROTHEA. "The vocalization of infants" *Psychol. Bull.*, 26: 1929, 625-651.

(30) MORRISON, E. E. "Speech defects in young children" *Psychol. Clinic*, 8: 1914, 138-142.

(31) "Preschool and Parental Education." (*Twenty-Eighth Yearbook of this Society* Bloomington, Ill. Public School Publishing Co., 1929. 875 pp.)

(32) NICE, M N. *A Child That Would Not Talk*. (Proc. Okla. Acad. Sci., 2: 1922. Univ of Okla Bul New Ser. No. 247)

(33) NICE, M. N. "Concerning all-day conversations." *Ped. Sem.*, 27: 1920, 166-177.

(34) NICE, M. N. "Length of sentences as a criterion of a child's progress in speech" *Jour. of Educ. Psychol.*, 16: 1925, 370-379.

(35) PIAGET, J. *The Child's Conception of the World*. (New York: Harcourt, Brace and Company, 1929. 397 pp.)

(36) PIAGET, J. *The Child's Conception of Physical Causality*. (New York: Harcourt, Brace and Company, 1930. 309 pp.)

(37) PIAGET, J. *The Language and Thought of the Child*. (New York: Harcourt, Brace and Company, 1926. 246 pp.)

(38) PROBST, CATHERYN A "A general information test for kindergarten children." *Child Develop.*, 2 1931, 81-95.

(39) REMER, L. M. "Handicaps of school entrants." (Univ. of Iowa Studies in Child Welfare, 6: 1932, 195-207.)

(40) SHIRLEY, M M. *The First Two Years: a Study of Twenty-five Babies. II. Intellectual Development*. (Institute of Child Welfare Monograph Ser. No. 7. University of Minn., 1933. 513 pp.)

- (41) SMITH, M. E. "A study of the speech of eight bilingual children of the same family" *Child Develop.*, 6: 1935, 19-25
- (42) SMITH, M. E. "A study of five bilingual children from the same family." *Child Develop.*, 2: 1931, 184-187
- (43) SMITH, M. E. *An Investigation of the Development of the Sentence and the Extent of Vocabulary in Young Children*. (Univ. of Iowa Studies in Child Welfare, 3: No. 5, 1926. 92 pp.)
- (44) SOMMERS, A. T. "The effect of group training upon the correction of articulatory defects in preschool children" *Child Develop.*, 3: 1932, 91-103.
- (45) STERN, WILLIAM. *The Psychology of Early Childhood* (New York: Henry Holt and Company. 3rd ed Eng. transl., 1924. 552 pp.)
- (46) TERMAN, LEWIS M., et al *Genetic Studies of Genius*, Vol I. (Stanford University Press, 1926. 648 pp.)
- (47) TERMAN, LEWIS M. *The Measurement of Intelligence*. (Boston Houghton Mifflin and Company, 1916. 350 pp.)
- (48) TOWN, C. H. *An Analytic Study of a Group of Five- to Six-Year-Old Children*. (University of Iowa Studies in Child Welfare, 1: 1925. 87 pp.)
- (49) TOWN, C. H. "Language development in 285 idiots and imbeciles." *Psychol. Clinic*, 6: 1912-13, 229-235
- (50) TRACY, F. "The language of childhood." *Amer. Jour of Psychol.*, 6: 1893, 107-138. (Also published in *The Psychology of Childhood*. Boston D. C. Heath and Company, 7th ed., 1909, 118-165)
- (51) WARING, E B *The Relation between Early Language Habits and Habits of Conduct Control*. (Teach. Coll Contr. to Educ., 260: 1921)
- (52) WELLMAN, BETH I ; MENGERT, CASE I ; and BRADBURY, D. *Speech Sounds of Young Children*. (Univ of Iowa Studies in Child Welfare, 5: 1931. 82 pp.)
- (53) WATSON, JOHN B. *Psychology from the Standpoint of a Behaviorist*. (Philadelphia: J. B. Lippincott, 1919. 429 pp.)

CHAPTER XI

LANGUAGE: THE DEVELOPMENT OF ABILITY IN ORAL AND WRITTEN COMPOSITION¹

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I. INTRODUCTION

The basis of an instructional program in language and composition should be a well-established body of information about the uses of oral and written speech at various stages of development. At the present time there is no general agreement as to what should be taught at the different grade levels, because there is a lack of dependable objective data about the ways in which children at each stage use composition. There is also no agreement about the items they should learn, the grade placement of these items, and the standards of composition children should be expected to achieve at the various levels.

A canvass of researches in the development of composition revealed few studies that deal with the question of determining the optimal levels at which to teach any of the major elements of composition, such as the various marks of punctuation, particular rules of grammar, phases of sentence structure, or usage of verbs and pronouns. No studies dealing with the actual learning difficulty of any of these items were discovered. The paucity of studies dealing with development of composition is indicated by the fact that in the recent *Review of Educational Research* dealing with related topics only one study was discussed under the heading of gradation for the three-year period covered by this report.

There are available a considerable number of investigations dealing with the general nature of the development of oral and written composition. They deal with such topics as the ways in which children at various stages of development use oral and written speech, the rate of

¹ Dr. Dora Smith, of the University of Minnesota, and Dr. Lou LaBrant, of Ohio State University, made valuable suggestions in connection with the content of this chapter.

growth of ability in composition, the changing characteristics of composition at successive levels of the school, and the difficulty of items of usage, punctuation, and structure as measured by the results of tests administered to pupils at various levels of the school. This information gives a fairly satisfactory picture of the characteristics of composition at various stages of development and should be of assistance to teachers and curriculum-makers in planning the instructional program. The lack of information as to the optimal points at which to teach any of these items suggests a field of fundamental research in composition.

II. FORMS OF ORAL AND WRITTEN SPEECH USED

A number of important studies have been made to determine the ways in which boys and girls use oral and written language at various levels of the school. Included in this group are such studies as those of W. Barnes (3), R. Barnes (2), and Baker (1). Studies have also been made by Clapp (8), Johnson (21), and Searson (32) of adult uses of language. The information on these points was secured in various ways, such as through questionnaires, check-lists, diaries, and other forms of records and reports. Because of the lack of complete objectivity of these methods the data secured are not fully dependable; however, the trends they suggest are of real value and importance.

These studies make it clear that in the affairs of daily life the activities involving oral speech are much more common and frequent in occurrence than the activities involving writing. This is true at all levels of development. This finding is of consequence in dealing with the curriculum, since investigations of the use of the time during the language period show that much more emphasis is commonly placed on written composition than on oral composition. The question may be raised, should not instruction place greater emphasis on the development of effective oral speech than at present? Are there conditions in classrooms that interfere in any way with the growth of the ability of the individual pupils to express ideas orally?

The importance of this problem in dealing with language development was made evident by a recent study of problem cases in language expression (30) which showed that such factors as timidity induced by the presence of the group, having nothing to say, wanting to talk all of the time without having anything significant to say, speaking too fast or too slowly, and similar items, many of them aspects of personality, contribute to faulty growth of oral speech. Their correction requires careful guidance by the teacher. The percentage of problem cases

reported in this study varied from 33 percent of the pupils in Grade I to 18 percent in Grade VI. There was a gradual decrease in these percentages from grade to grade. No data were reported for the higher grades. It is essential that the factors related to personality be given careful consideration in the planning of the instructional program.

It has been established that boys use written speech much less than do girls, and that letter-writing, primarily of friendly letters, is the activity in which written speech is used most frequently by both boys and girls of junior- and senior-high-school age (3). Business letters written by children for themselves and for others constitute, however, from a fourth to a sixth of these letters (2). From his study of the situations in which children in Grades IV to VI write letters, Fitzgerald (9) concluded that these children need help not only on the mechanics of letter writing, an element stressed in most classes, but also on when to write various forms of letters, such as letters of greeting, congratulation, condolence, and encouragement. However, these types of letters were found but rarely among those included in Fitzgerald's investigation. The question may be raised: To what extent should we expect children at this stage of development to write letters of these kinds? Is the fact that they write so few such letters due to the undesirable effect of the present program of instruction, or do children at this stage normally not write such letters? This item merits more extended investigation, especially at levels above those at which Fitzgerald made his studies. He also concluded that the pupils should be taught the value of sincerity in letter-writing; they should learn to recognize their obligations in the various specific situations that demand letter-writing; they should learn to write sensitively and appropriately in social situations. The important question in this connection is, what are the sorts of social situations in which children at various stages of development write letters? Would an instructional program dealing with social amenities change to any extent existing practices in the letter-writing of children?

Next in order after letter-writing rank the writing of stories and poems, the keeping of diaries, and the listing of items; the combined total of these items is about the same as for letters. Very few children at this level fill out forms, keep minutes of meetings, or take notes on what is read outside school. More extensive studies (4) are needed of the uses of oral and written speech at various levels of the school in order that a more dependable basis for the gradation of items can be established.

III. THE GENERAL GROWTH OF THE QUALITY OF WRITTEN AND ORAL COMPOSITIONS

The growth of the ability to write well-organized compositions and letters is a highly complicated process. In the first place, there is involved the gradual development of the oral and written vocabulary. When these are inadequate, the pupil finds difficulty in expressing his ideas, often because of lack of basic experience—he may have no thoughts to express about the topic under consideration. In the second place, there is involved a complex developing physical process (namely, handwriting) that interferes seriously with the expression of ideas in the case of young children.¹ In the third place, there are numerous formalities in style, usage, and grammar that must be borne in mind in expressing ideas. Finally, the pupil must master numerous rules for capitalization and punctuation, which in themselves constitute a real burden.

Under such conditions it is not to be wondered at that there is a very slow improvement in the quality of compositions from grade to grade (21). The changes that take place in a year amount to only a small fractional part of a step in such composition scales as those of Hudelson, Van Wagenen, and Willing. On a ten-point scale a half-step is usually considered as equivalent to a year's growth. These small differences are very difficult to detect and at present cannot be reliably measured, partly because they are so slight, partly because available scales do not make it possible to measure in units small enough to bring out the differences that do exist. There is an overlapping of from 60 to 85 percent in the scores of the pupils in any one grade and those of pupils in the grades immediately above and below (21). In a single class there is often a range in ability of as much as six grades. It is not uncommon to find college students whose ability ranges upward from sixth-grade medians. The average length of compositions on similar topics, however, increases rapidly from grade to grade.

This exceedingly wide range in compositional ability is an outstanding fact for teachers of English to face. It is not a desirable practice to set up the median performance of pupils in a class as the standard for the grade. If this is done, there is danger that mediocre work will be accepted from pupils of superior ability and at the same time the

¹ On handwriting, see Chapter XIII.—*Editor.*

standard will be too high for pupils of inferior ability to meet. Ability in composition, in other words, is a highly individual matter — a fact that should be recognized in the instructional program.

A danger in the setting up of standards based on available scales grows out of the fact that these scales do not measure the creative, imaginative quality of the compositions or their originality, freshness, and intrinsic interest. At present we lack means of measuring the growth of these highly valuable traits of written composition and consequently have not been able to measure the effectiveness of methods intended to develop them. Furthermore, undue stress has been placed upon the formal, mechanical, and rhetorical aspects of composition, chiefly because these have been emphasized by current means of evaluating written composition. It is being recognized that content and organization of ideas are of primary importance and that form, which deals largely with matters of careful scrutiny, is of value only as it helps to achieve the ends desired. The ends themselves are of greater consequence.

There are no published studies that give reliable measures of the improvement of the quality of oral composition. Practically all studies dealing with the characteristics of oral composition consist of analyses of errors in usage heard during observed lessons or found in records of oral speech, such as dictaphone records (5, 18). None deals with the growth of the quality or richness of oral expression, although Netzer (27) has done some preliminary work to devise a means of measuring growth in oral composition. The problem is particularly complicated because of the difficulty of standardizing and controlling test situations.

IV. THE CHANGING CHARACTERISTICS OF ELEMENTS OF COMPOSITION

Numerous studies have been made of the changes in the characteristics of elements of written composition for individuals of a wide range of ages. These investigations deal with such items as changes in the structure of sentences, in the marks of punctuation used, and in the kinds of errors made in usage, syntax, capitalization, and punctuation.

1. Changes in Sentence Structure

The studies of sentence structure have attempted to determine the changes that take place in various ways. One group of studies has dealt with the changes in the use of simple, complex, and compound sentences. A good illustration of this type of study is that of Hoppes (17), who analyzed the structure of sentences in themes written by 386

children in Grades III to VI. The percentages of each kind of sentence for each grade follow.

<i>Types of Sentence Structure</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
Simple sentences	55.5	49.4	46.9	43.2
Complex sentences	28.5	33.0	34.5	36.4
Compound sentences	10.1	9.4	9.6	9.6
Compound-complex sentences	6.1	8.4	9.1	10.9

These data show that the simple sentence was the type most frequently used at each grade level. There was also a small, but consistent, growth from grade to grade in the use of two of the three other types of sentences. Before reliable conclusions can be drawn on this point more extensive studies must be made of this and other forms of written composition at all levels of the school. It seems clear on the basis of available data that help in the use of the simple sentence should be given in all grades and that pupils in grades below the sixth should also be given special help on the use of complex sentences. Recommendations as to procedures with compound and compound-complex sentences in the first six grades are less certain. At present we lack any sound basis for recommendations.

Hoppes (18, 19) also furnished a valuable list of measures by which the elementary-school teacher can estimate progress in the development of language expression with respect to: (a) increasing length of sentence and whole composition, (b) decreasing ratio of simple sentences and a corresponding increase in the ratio of complex and compound sentences from Grade III to Grade VIII, (c) marked decrease in run-on sentences beyond the fourth grade, (d) reduction in unpleasant repetition of words, (e) increased use of the inverted order and sentence variety, (f) decrease in the number of misplaced modifiers, (g) increased proportion of nouns of abstract versus concrete meaning, and (h) decline in egocentrism revealed by a reduction in number of sentences beginning with the pronoun *I*.

Another important study in the field of sentence structure is La-Brant's (22) investigation of how the child uses independent and dependent clauses. She analyzed the written compositions of 1,007 pupils in Grades IV to XII, ranging in mental age from 8 years, 5 months, to the superior-adult level, and classified the kinds of clauses used by each individual. In all, 20,320 clauses were analyzed. She found that "while dependent clauses increase in frequency with increasing ma-

turity of the writers, they also increase in complexity and clarity of thought. Increase in subordination is paralleled by increasing exactness in the use of connectives." She found that "the average length of the clause (proportion of predicate to other words used) is comparatively constant between the ages of eight and sixteen," and that complexity of the sentence increased with both mental and chronological age. A closer relation was found to chronological age than to mental age, indicating the importance of experience in relation to language development. She also found that the "proportion of infinitives to subordinate predicates decreases with increasing maturity of the writers." The percentages of condition, concession, place (adverbial), purpose and result, and comparison clauses are very small at each mental level, constituting less than 6 percent of the total clauses used. The "which" clause loomed large in this study. These facts have important implications for those concerned with the development of a functional-grammar curriculum. Noun clauses appeared only once in every twenty-six clauses. The writings of a group of twenty-one eminent psychologists, also analyzed by LaBrant, had a 10-point higher index of subordination than that found for high-school pupils, and the clauses for this adult group were nearly twice as long as those used by the high-school pupils. So high a degree of language skill was not attained by the most superior of the high-school students included in this study. LaBrant's study reveals the close relation between control over language, as a means of expressing and relating ideas, and the developing mental processes. It also shows the influence of richness of experiential background on speech development, a factor to which the program of the school can make a great contribution.

These and other studies clearly show that there is a gradual development in the complexity of sentence structure from grade to grade, and indicate the types of sentences to stress in instruction at various stages of development. Unfortunately, we have no available data pertaining to changes relative to problems of writing.

2. The Use of Marks of Punctuation

Unfortunately few studies have been made of the punctuation items used by children in their writing activities. The most important research in this field is the investigation by Cesander (6), who analyzed 2,466 themes written by children in Grades IV to VI. He found a total of 118 specific items. In the fourth grade the frequencies of 17 specific items accounted for 88 percent of the total number of uses; in Grade V

24 items accounted for 88 percent of the total number; and in Grade VI 26 items accounted for 85 percent of the total. On the basis of his findings he compiled graded lists of punctuation (too detailed to be quoted here). An examination of the lists for the several grades shows that they overlap considerably, owing to the fact that in all grades certain marks are used by most pupils. This study should be extended to include other functional kinds of writing, such as letters, reports, and the like, and to other grade levels.

3. Analysis of Errors in Structure, Usage, Syntax, and Punctuation

Numerous studies have been made of faults of various kinds found in the written and oral speech of children and adults. Included in this group are the well-known investigations of Guiler (12), Symonds (34), Pressey and Campbell (31), Charters (7), and many others (14, 21, 26). These studies, however, do not present an integrated attack on the problem and the findings are at best suggestive. In most cases they give information as to the status of the items investigated at each level, but present no information as to the optimal point in the curriculum at which to teach any of the items. The studies reveal as a major problem weaknesses in verbs. Syntactical redundancy and improper uses of the pronoun and double negative loom large in the elementary-school studies. A few items are responsible for a large proportion of errors and these occur at all grade levels, indicating the need of a continuous rechecking of such errors. The improvement of pupils from grade to grade is shown to be slight. The errors made in usage and structure are so varied as to suggest group, or individual, rather than class, treatment.

Of fourteen elements of composition, punctuation ranks first in difficulty and capitalization about fifth. Because of the varied nature of the details of the categories used in the different studies, it is not possible to make comparisons of the results for the individual items. It appears, however, that, as was true of usage and structure, errors on a small number of items constitute the major portion of the total. The errors are also highly individual and, here again, the need of instruction adapted to the needs of each pupil is evident.

Powell (29) studied the relation between correct usage, as measured by errors in compositions and proof-reading tests, and non-mechanical quality ratings of compositions. He found a correlation of .59 between the results of an 'error-count' procedure and a proof-reading test, both of which had high reliabilities. This none too high

correlation shows that it is important to consider the procedure used in determining the difficulty of usages. Powell favors the proof-reading procedure because it is more economically and easily administered than the error-count technique. He also found that the correlation between ratings of compositions based on the 'error-count' technique and the ratings for non-mechanical quality of compositions was $-.42$, showing that skill in the use of mechanical elements of writing and the quality of expression are substantially different functions. This means that high achievement on mechanical elements of general quality will not necessarily insure equally good results on the non-mechanical aspects of composition.

Studies of errors in the ordinarily written speech of pupils are subject to a number of limitations. It is obvious, for example, that children do not make certain kinds of errors frequently, if at all, in certain grades, because the items involved are seldom used; that is, the pupil uses the forms he chooses to use. Furthermore, none of the published studies indicates the frequency of use of the various items in relation to the number of errors made, so that an index of the difficulty and cruciality of each of the items cannot be established.

In an unpublished study Washburne and Leonard (35) determined the percentage correct in Grades III to VI, on correction-of-error tests and in one thousand compositions, based on frequency of use of elements in punctuation and capitalization that had been studied and those that had not been studied. Correlations of about .70 were found for each grade between the two sets of results. For most elements the rise in the percentage of correctness for Grades III to VI was reasonably consistent and rapid. Certain items, such as capitals for titles of address, were almost one hundred percent correct in Grade III in both test and composition; others showed high scores in the grades in which they had apparently been taught but dropped off in succeeding grades, as, for example, the use of capitals for names of land and water forms.

The topics were then assigned to the grade in which the children made scores, on the average, of over 75 percent on their compositions after having studied the element. Ratings based on actual use, rather than on correcting errors, were used because of their greater significance in terms of the child's real needs. This study should be repeated under more carefully controlled conditions and on a larger scale.

The tentative graded course of study for items on which dependable data were available follows:

Third Grade

1. Capital at the beginning of a sentence.
2. Period at the end of a sentence.
3. Capitals for names of persons.
4. Capitals for titles of address.
5. Capitals for names of cities, states, streets, countries.
6. Capitals for names of peoples.
7. Capitals for names of days of the week.
8. Capitals for names of schools, holidays, public buildings, social betterment organizations, titles of books, parks
9. Capitals in salutation.
10. Capitals in complimentary close of letter.

Fourth Grade

1. Capitals for names of land and water forms.
2. Periods after abbreviations.
3. Comma between month and year.
4. Comma in series.
5. Colon after salutation.

Fifth Grade

1. Question mark after a question.
2. Comma between city and state.
3. Hyphen after a syllable of a word that is broken at the end of a line.

Sixth Grade

1. Apostrophe in contractions.
2. Apostrophe in singular possessives.
3. Quotation marks in simple quotations.

Seventh Grade and Above

1. Comma after word of address.
2. Comma after *yes, oh, no.*
3. Comma and quotation marks in divided quotation.

High School

1. Apostrophe after *s* in plural possessives.
2. Exclamation marks after exclamation.
3. Comma to set off words in apposition.

Comparisons of the results of the various studies for punctuation and capitalization are particularly unreliable because there is no generally accepted set of standards concerning many of the items (11).

Account should also be taken of the problems of expression, which arise out of the increasing complexity of thought and material of thought. Children seem to master simple sentences by the end of Grade III. Then more complex ideas grope for expression, sentences become too much for pupils, and fragments, involved and muddled sentences, and similar faults appear in oral and written work. As a result, an index of difficulty of a particular item, say a verb form, at one grade level may not be valid for a succeeding level. Charters found more verb errors in Grade VIII than in Grade III. This doesn't necessarily mean that there was no improvement. Rather it seems to mean that there was an effort at more varied and complex expression.

V. MEASURES OF THE DIFFICULTY OF LANGUAGE ITEMS

A large body of information is available concerning the difficulty of a considerable number of items in composition as measured by the results of tests administered to pupils in a wide range of grades. The two most important studies in this field are those of O'Rourke and of Guiler. In the O'Rourke study (28) carefully constructed tests dealing with a wide variety of items in English usage were administered to pupils in Grades III to XII, as part of a nation-wide study of the English curriculum. O'Rourke concludes that the relative difficulty of individual principles, on the basis of ranking, is practically constant from grade to grade. But there were marked differences in the difficulty of the various principles. Some items were difficult in all grades. The need of constant, continued review is indicated. Wide variations were also found in the possible varied applications of the same principle at the same grade level, suggesting the "danger of generalizing as to the difficulty of a principle of usage." O'Rourke found a slight, but gradual, decrease in the percentage of error on most principles from grade to grade, indicating a general growth in the ability to apply the principle, probably to be ascribed to the influence of instruction. This growth, however, was so slow that the apparent ineffectiveness of the present instructional program is clearly revealed. The growth of the score on a group of "essentials" was from 34.7 in Grade VII to 85.4 in Grade XIII. On a group of "niceties" the improvement was from 23 percent in Grade VII to 66.9 percent in Grade XIII. The results show that many of the basic items have not been mastered by numerous college freshmen.

The Guiler (13) study reports the results of tests of English usage administered to pupils in Grades III to XII in Ohio. The tests required

the pupils to detect errors in both usage and certain punctuation marks. The findings were in both instances practically the same as those of the more comprehensive study of O'Rourke. Wide differences of scores and overlapping of results from grade to grade characterized the results. The combined ranking of the major group of items on the basis of the results for Grades III to VI combined were as follows:

<i>Item</i>	<i>Error Quotient</i>	<i>Rank</i>
Punctuation	58	1
Capitalization	47	2
Case of pronouns	41	3
Use of adjectives and adverbs	34	4
Use of verbs	27	5
Miscellaneous types of usage	26	6
Other uses of pronouns	23	7

The combined ranking of nine groups of items for pupils in Grades VII to XII combined were as follows:

<i>Item</i>	<i>Error Quotient</i>	<i>Rank</i>
Use of grammatical sentence structure	81	1
Other uses of pronouns	76	2
Use of punctuation marks	61	3
Use of adjectives and adverbs	59	4.5
Use of prepositions and conjunctions	59	4.5
Use of capital letters	57	6.5
Miscellaneous types of usage	57	6.5
Use of verbs	52	8
Use of case of pronouns	41	9

Guiler's results for these two levels of the school are not strictly comparable, since the tests used differed in content. It is clear that, on the basis of the tests for Grades III to VI, punctuation and capitalization were most difficult for the pupils in these grades. Both elements were also very difficult for Grades VII to XII, although their relative ranking was not the same in both groups of grades. Guiler presents a difficulty index for the items included in his test for each grade.

Goodman (10) and Lines (23) have also reported the results of a study of the difficulty of various punctuation and capitalization abilities for pupils at several grade levels. Their studies were more analytical than those of Guiler and O'Rourke, but their general conclusions were practically the same. They found that growth in ability to capitalize and punctuate tends to increase from Grade V to XI, with minor fluctuations from grade to grade. Some punctuation usages are practically mastered by the middle of Grade XI — for example, periods at the ends

of declarative or imperative sentences. Goodman also listed seven 'demon' rules of punctuation, such as the use of the apostrophe to show the possessive of a noun. Similar information is given for capitalization usages. Goodman found a high degree of constancy of the error rankings for both capitalization and punctuation from grade to grade.

VI. RELATION OF CONTROL OF MECHANICS OF EXPRESSION AND QUALITY OF COMPOSITION

There are few data to indicate at what point the mechanics of writing (penmanship, time required for actually transcribing a hundred words, spelling,¹ and similar matters) are sufficiently mastered not to overshadow the matter of the experience or idea to be presented. Shaw (33), for example, allowed young children to dictate their stories, poems, and little character sketches to her. The children, relieved of the burden of transcribing, produced charming and meaningful compositions. The plan of allowing very young children to dictate has also been followed by a number of parents. Several of our youthful poets have composed before they could write. Many of the more informal schools follow this device with children in the primary grades. We need to discover when the satisfaction in doing his own writing compensates the child for the drudgery involved. It is probable that this point is dependent in fact upon muscular coördination, and varies with the length of the composition.

Haefner (14), studying the effect of typewriting skill on the written composition of children, reports that "the general reduction in physical strain which writing on a machine seems to facilitate, leads to an increased freedom and flexibility of expression." He reports children in the lower grades as using a more extensive vocabulary and experimenting with new kinds of sentence structure and with new forms, such as poetry and plays, as a result of acquiring skill in typing. He finds them using not only more words but *longer* ones. This latter fact seems most significant, pointing to previous selection in terms of the effort of writing down words. As is to be expected, these children also write longer themes than they did while using script. The study not only throws light on the relation between what the child wants to write and what he usually puts down, but also suggests need for thorough study of the teaching of typing in the grades. It is evident that we have in our reading programs recognized modern book-production and present

¹ On spelling, see Chapter XII; on penmanship, see Chapter XIII.—Editor.

reading demands as relevant to the school program. We must note that the modern world of personal writing has changed also.

While recent trends in educational practice have emphasized the place of written composition as an outgrowth of real experience and have substituted varied and purposeful writing for formal teaching, the literature on this subject is as yet comparatively small.

Boeh (5), in an unpublished master's thesis, reports that pupils in the seventh and eighth grades whose English work was presented "as an activity" showed more improvement in English expression and applied the knowledge acquired in English more generally to other subjects than did a group taught by traditional methods.

VII. CONCLUSION

The information concerning the relative difficulty of the various items just presented is of considerable value in the gradation of the contents of the curriculum. However, it should be pointed out that in none of the studies reviewed was there any attempt made to determine the actual learning difficulty of the various items on the basis of a carefully organized teaching program. The difficulty ratings that are given are based on the results of tests administered to pupils who may or may not have been taught the various items. What is therefore needed before the various items can be assigned with any assurance to a given level of the school is a careful study of the detailed characteristics of the writing of the children both in and out of school under favorable conditions and an investigation to determine the relative learning difficulty of each of the elements under a well-managed instructional program. Until both of these studies have been conducted on a comprehensive scale, we cannot proceed with any assurance in the organization of the curriculum dealing with usage, punctuation, capitalization, and all other essentials of both oral and written composition.

BIBLIOGRAPHY

(Limited primarily to studies referred to in this chapter)

- (1) BAKER, E. "A social basis for the teaching of elementary English language." *Elem. School Jour.*, 30: 27-33; also "A social basis of oral composition." *English Jour.*, 19: 208-215.
- (2) BARNES, R. "The Uses of Written Language by Junior High School Pupils." (Unpublished master's thesis, University of Minnesota, Minneapolis, Minnesota)
- (3) BARNES, W. "Certain Aspects of the Out-of-School Language Activities of Children in the Seventh, Eighth, and Ninth Grades." (Doctor's thesis, School of Education, New York University, 1930)

- (4) BETTS, E. A. "An Evaluation of Certain Techniques for the Study of Oral Composition." (*University of Iowa Studies in Education*, 9: No. 2. Iowa City: University of Iowa, 1934, pp. 7-32)
- (5) BOEH, L. G. "The Practicability of an Activity Program in English in the Upper Elementary Grades of a Departmental School." (Master's thesis, 1933, University of Cincinnati)
- (6) CESANDER, P. K. "Grade Placement of Punctuation." (Unpublished doctor's thesis, University of Iowa, Iowa City, 1931)
- (7) CHARTERS, W. W. *Curriculum Construction*. (New York: The Macmillan Co., 1925, Chap. 17)
- (8) CLAPP, J. M. *The Place of English in American Life*. (National Council of Teachers of English, Chicago, 1930)
- (9) FITZGERALD, J. W. "Situations in which children write letters in life outside the school." *Jour. of Educ. Method*, 12: 223-231.
- (10) GOODMAN, J. H. "Growth in punctuation and capitalization abilities." *Jour. of Educ. Research*, 28: 195-202.
- (11) GREENE, H. A. "A Criterion for a Course of Study in the Mechanics of Composition." (*University of Iowa Studies in Education*, 8, No. 4. Iowa City: University of Iowa, 1933)
- (12) GUILER, W. "Analysis of capitalization errors." *English Jour.*, 20: 21-26.
- (13) GUILER, W. *The Ohio Survey of English Usage*. (Miami University, Oxford, Ohio)
- (14) HAEFNER, R. W. *The Typewriter in the Primary and Intermediate Grades*. (New York: The Macmillan Co., 1932)
- (15) HARAP, H. L. "The most common grammatical errors." *English Jour.*, 19: 440-446.
- (16) HATFIELD, W. *An Experience Curriculum in English*. (A report of a commission of the National Council of Teachers of English, English Monograph, No. 4. New York: D. Appleton-Century Co., 1935)
- (17) HOPPES, W. C. "The Development of Written Expression among Children of Elementary School Grades." (Unpublished doctor's thesis, Department of Education, University of Chicago, 1931)
- (18) HOPPES, W. C. "Considerations in the development of children's language." *Elem. English Review*, 11: 66-70.
- (19) HOPPES, W. C. "Some aspects of growth in written expression." *Elem. English Review*, 10: 67-70, 121-123.
- (20) HULTZ, HELEN L., and ZYVE, CLAIRE. "The effect of phonographic recording in improving children's speech." *Elem. English Review*, 11: 183-187
- (21) JOHNSON, R. I. *English Expression*. (Bloomington, Illinois: Public School Publishing Company, 1926)
- (22) LABRANT, LOU. "A Study of Certain Language Developments of Children in Grades Four to Twelve, Inclusive." *Genetic Psychology Monographs*, No. 5, November, 1933.
- (23) LINES, C. S. "Diagnostic Testing in the Field of English." (Master's thesis, University of Minnesota, 1936)
- (24) LYMAN, R. "Summary of Investigations Relating to Grammar, Language, and Composition." (Supplementary Education Monograph, No. 36. Chicago: University of Chicago Press, 1929)

- (25) MABIE, ETHEL "A Study of Language Expression in the Madison Public Schools." (Madison, Wisconsin: Board of Education, 1932. Mimeographed)
- (26) MEARNs, HUGHES *Creative Writing*. (Garden City, New York: Doubleday, Doran and Company, 1929)
- (27) NETZER, R. F. "The evaluation of a technique for measuring improvement in oral composition" *Jour. of Exper. Educ.*, 6: 35-39.
- (28) O'ROURKE, L. J. *Rebuilding the English Usage Curriculum to Insure Greater Mastery of Essentials*. (Washington: Psychological Institute, 1934)
- (29) POWELL, R. L. "Valid Testing and Diagnosis in the Mechanics of Ninth-Grade English Composition." (*University of Iowa Studies in Education*, 9 No 1, January 15, 1934, pp 97-128)
- (30) PRESSEY, L. C. "Freshman needs in written English." *English Jour.*, 19. 705-710.
- (31) PRESSEY, S. L., and CAMPBELL, P "The causes of children's errors in capitalization." *English Jour.*, 22. 197-201.
- (32) SEARSON, J. W. "Meeting the public demand." *English Jour.*, 10: 327-331.
- (33) SHAW, R. F. "Out of the mouth of babes: A new way to teach the very young" *Atlantic Mo.*, 154. July, 1934, 66-73.
- (34) SYMONDS, P., and LEE, B "Studies in the learning of English expression, I." *Teachers College Record*, 30. 461-480.
- (35) WASHBURN, CARLETON, and LEONARD, STERLING A. "Grade Placement of Capitalization and Punctuation" (Unpublished report, Research Department, Winnetka Public Schools, 1927)

CHAPTER XII

LANGUAGE: THE DEVELOPMENT OF ABILITY IN SPELLING

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In considering the problem of instruction in spelling in relation to child development, it is important to realize that growth in vocabulary is closely related to the acquisition of experiences. A new experience for the child usually supplies him with new words by means of which he can talk, read, write, and think with some degree of understanding. This means that the child's development in writing vocabulary is greatly influenced by the number, variety, and quality of his experiences. Consequently, there is good reason to believe that instruction in spelling thrives best in the setting of a rich curriculum that includes, among many things, a sound program in written composition as such and ample opportunity for the use of sensible types of writing activities in connection with all school work.

Lack of space prohibits a discussion of most of the important problems involved in an adequate adjustment of instruction in spelling to child development. This chapter is limited, therefore, to a consideration of two fundamental problems. These are: (1) the selection of the words that should be learned by the end of the school period, and (2) the determination of the words most appropriate to the needs and development of children in each of the various grades. The first problem deals with the course of study as a whole; the second problem with the course of study in a given grade.

I. SELECTING THE WORDS TO BE TAUGHT IN THE ELEMENTARY SCHOOL

Careful selection of the words to be taught in the elementary school involves two major steps. First, the words most important for children

to learn to spell must be identified. Second, it must be ascertained which of these words are so simple that they can be learned by the end of the elementary-school period without definite and direct instruction in spelling. Some of these latter words offer considerable spelling difficulty to children at the early grade levels in which the words are needed in writing and should be included to facilitate the writing done in those grades. The emphasis, however, at all grade levels should be upon the words of persistent difficulty.

1. What Words Are Most Important to Learn to Spell?

Practically all investigators have utilized the hypothesis that the most important words to learn are those most important in the writing that people do. Several criteria have been used in measuring the relative value of a word in writing. Among these are: (1) the total *frequency* with which the word is used; (2) the *commonness* with which the word is used by everyone, regardless of geographical locality, sex, social or economic status, educational level, or occupation; (3) the *spread* of the word's use in different types of writing; (4) the degree of *cruciality* possessed by the word, as evidenced by the types of writing in which it is used and the severity of the penalty attached to its misspelling; (5) the probable *permanency* of the word's use; (6) the *quality* of the writing in which the word appears; and (7) the *persistent difficulty* of the word.

The great majority of individual investigations have gathered data on only the first two of these criteria — the frequency and commonness with which the word is used. In doing this work, two major approaches have been employed. In one group of studies the writing of adults was analyzed; in a second group of studies, the words found in the writing of children were tabulated.

a. Studies of the Writing of Adults. Beginning in 1913 with the pioneer study by Ayres, some twelve or more important investigations of the commonness and frequency with which words are used by adults in writing had been reported by 1926.¹ In that year, after completing

¹ Typical studies are: (a) W. N. Andersen. "Determination of a Spelling Vocabulary Based upon Written Correspondence." *University of Iowa Studies in Education*. Vol. 2, No. 1. (Iowa City, Iowa, 1921); (b) E. Horn. "The vocabulary of bankers' letters." *English Jour.*, 12: June, 1923; (c) W. A. Cook and M. V. O'Shea. *The Child and His Spelling*. (Indianapolis: The Bobbs-Merrill Company, 1914); (d) W. F. Clarke. "Writing vocabularies." *Elem. Sch. Jour.*, 21: January, 1921, 349-351

several intensive individual studies that accumulated data on other criteria as well as commonness and frequency, Horn published a compilation of all studies made at the adult level.¹ This compilation includes the tabulation of more than five million running words. More than 36,000 different words were found. The monograph in which this study is reported presents the data concerning the total weighted frequency credits for each of the ten thousand words used most commonly and frequently by adults in writing.

It is important to realize that in making this compilation, data on most of the criteria previously listed were utilized. An examination of the frequency credits in this list, together with a consideration of the sources of data analyzed, shows that the four or five thousand most important words, with their repetitions, constitute a common core of writing vocabulary needed by the great majority of persons regardless of sex, occupation, social or economic status, educational level, or geographical locality. A comparison of this common core with words used in the writing of adults many years ago shows that, with few exceptions, these five thousand words have been used for many generations. The inner consistency of the words in the various sources analyzed, the marked overlap with the Thorndike list of words most frequently found in reading, and the significant degree to which the words parallel those found from investigations in other languages indicate that this core is not likely to be modified greatly by additional investigations. At any rate, this investigation furnishes the only existing evidence concerning the most important ultimate and permanent spelling needs of school children in the United States.

b. Studies of the Writing of Children. Up to the present time, investigations of the writing vocabulary of children have been concerned chiefly, if not entirely, with discovering the frequency and commonness with which words are used. Three types of material have been analyzed: (1) themes written in school, (2) other types of school writing, and (3) letters written outside the school.

Beginning with the well-known study by Jones in 1915, a first series of investigations of the vocabulary of children's themes, from the second to the eighth grade inclusive, was completed about 1921.²

¹ Ernest Horn. *A Basic Writing Vocabulary*. (University of Iowa Monographs in Education. First Series, No. 4. College of Education. State University of Iowa, 1926)

² Typical studies are: (a) W. F. Tidyman. "Survey of the Writing Vocabularies of Public School Children in Connecticut." (Teacher's Leaflet No. 15.

As a rule, in these studies theme topics were arbitrarily assigned or the child was directed to write about any topic of his own choice. Although the results of these studies have been utilized as evidence regarding the words used most commonly and frequently by children in writing, it is clear that the data have serious limitations. None of the early investigators seems to have made any attempt to tabulate words from the types of writing that children *should* do. Some of the investigators failed to make or report frequency counts, so that no measure of the relative importance of words was provided. More recent investigations have shown that these particular theme studies disagree greatly in the vocabulary they report, that they are markedly out of accord with one another in their assignment of words to the various grades, and that they do not provide anything like an adequate measure of children's writing vocabulary.¹ These shortcomings are apparently due to the lack of extensiveness of the data collected and to faulty distribution of sampling.

Because there is good reason to believe that the child's writing vocabulary is greatly influenced by the topics on which he writes, a second series of theme studies was initiated about 1926 and is still in progress.² In the case of each of these studies, children were exposed to and stimulated by a wide variety of topics and questions falling within their experiences and interests. Additional studies of writing done in school, typified by the Lorenz investigation,³ have utilized records, reports, creative writing, announcements, and other types of writing that arise frequently in schools where a rich course of study in written composition is in operation, and where other activities are

United States Bureau of Education, Washington, D. C., 1921); (b) N. Bauer. *The New Orleans Public School Spelling List*. (New Orleans: F. F. Hansell and Bro., 1916); (c) W. F. Jones. *Concrete Investigation of the Material of English Spelling*. (University of South Dakota, Vermillion, S. Dak., 1915)

¹ For example, see: (a) H. B. Williams. "A Critical Evaluation of Investigations of Children's Writing Vocabularies." (Master of Arts thesis. State University of Iowa, Iowa City, 1926); (b) M. H. Obermann. "A Study of the Degree to Which the Written Vocabulary of Children Has Been Determined." (Master of Arts thesis. State University of Iowa, Iowa City, 1933)

² Typical studies are: (a) A. Wilmarth. "The Vocabulary of Rural Children's Themes." (Master of Arts thesis. State University of Iowa. Iowa City, 1926); (b) E. W. Nowlin. "The Vocabulary of Sixth-Grade Children's Themes." (Master of Arts thesis. State College of Education, Greeley, Colo., 1931)

³ E. Lorenz. "The Writing Vocabulary of Third-Grade Children." (Master of Arts thesis. State University of Iowa. Iowa City, 1929)

carried on in such a way that sensible types of writing become imperative. The compilation of the data secured in this second series of studies of the vocabulary of themes and other types of school writing has now reached approximately one million running words.¹ These data, including some ten thousand different words, are the beginning of the discovery of what words are used most commonly and frequently by children in the writing they do in school.

In order to accumulate data from the most normal writing activity of children, and in order to supply a more adequate measure of the importance of a word in terms of commonness, a series of investigations of the vocabulary of children's letters was begun about 1926 and is still in progress.² The most extensive of these studies is that completed by Fitzgerald.³ In the case of each investigation in the series, only letters written outside the school, entirely removed from any sort of school pressure or assignment, were analyzed. Up to the present time, the tabulation of more than one million running words from letters that represent every state in the Union and that were written by children from the second- to the eighth-grade level, inclusive, ranging in age from five to sixteen years, has produced more than 11,000 different words.⁴ This list would be greatly extended by the addition of the data of studies by Ashbaugh of the letters of junior- and senior-high-school students.⁵ These data are the beginning of the discovery of what words are used most commonly and frequently by children in writing letters outside the school.

Among the most important facts gleaned from the investigations

¹ P. McKee. "The Vocabulary of Children's Writing in School." (Unpublished study. State College of Education, Greeley, Colo.)

² Typical studies are: (a) N. Simpson. "The Vocabulary of Children's Letters" (Master of Arts thesis. State College of Education, Greeley, Colo., 1929); (b) M. Cox. "The Vocabulary of Third-Grade Children's Letters." (Master of Arts thesis. State College of Education, Greeley, Colo., 1929); (c) C. C. Riddle. "The Vocabulary of Fifth-Grade Children's Letters." (State College of Education, Greeley, Colo., 1932)

³ J. A. Fitzgerald. "The Vocabulary, Spelling Errors, and Situations of Fourth-, Fifth-, and Sixth-Grade Children's Letters Written in Life Outside the School." (Doctor's dissertation. State University of Iowa, Iowa City, 1931)

⁴ P. McKee "Vocabulary of Children's Letters." (Unpublished study. State College of Education, Greeley, Colo.)

⁵ E. J. Ashbaugh. "Non-school English of high-school students." *Jour. of Educ. Research*, 15: May, 1927, 307-313; also "Adjectives used by high-school students." *Educ. Research Bull.* Ohio State University, 8: September 11, 1929, 273-275.

of children's letters and from the second series of investigations of the vocabulary of school writings are the following:

1. Owing to the relatively small amount of material analyzed, our knowledge of the words used most frequently by children in writing is incomplete.
2. The early theme studies did not succeed in determining the words used most frequently by children in writing.
3. Because of inadequate sampling, data needed for determining the relative importance of words in terms of criteria other than gross frequency are lacking.
4. The vocabulary used by children in writing on a topic close to their interests and experiences differs significantly from the vocabulary they employ when writing on topics that are more or less artificial.
5. As the educational level advances, the number of different words used by children in writing increases.
6. The writing vocabulary of children is much larger than most persons have thought.
7. Although sufficient data are not yet available to determine reliably the four or five thousand words used most commonly and frequently by children in writing, the present data, reinforced with evidence from speaking and reading vocabularies, do enable us to make practical decisions with much less probability of error than exists in most curricular fields.
8. There are needed further investigations that will seek to determine the most important words used by children, as measured by all important criteria, in significant types of school writing and in the writing they do, or should do, outside the school, particularly at the first-, second-, and third-grade levels.

c. Comparison of the Writing Vocabulary of Adults and That of Children. During the past decade several writers have asserted that the words that children need to know how to spell should be discovered by analyzing the writing of children rather than that of adults. Obviously, this view assumes that the words of greatest importance in the writing of children are not the same as those of greatest importance in the writings of adults.

It is natural that the appearance of this view should stimulate comparisons between the two vocabularies. Unfortunately, however, most of the comparisons made have produced misleading results because of weakness in the lists employed to represent the words of greatest importance in the writing of children, and also because of the way in which the comparisons were made.¹ As indicated previously, existing

¹ The results of what is probably the best-known comparison are found in F. S. Breed. "What words should children be taught to spell?" *Elem. Sch. Jour.*, 26: December, 1925, 292-306.

data on children's writing vocabulary are weak either in validity, through failure to sample properly the various types of writing done by children, or in reliability, owing to the smallness of the counts made and to lack of consistency of the data. It is perfectly clear that the comparison to be made must be a comparison between the four or five thousand most important words used by children and the four or five thousand most important words used by adults. A reliable comparison cannot yet be made. No one knows what are the four or five thousand most important words used by children in writing.

Although the data on the vocabulary needs of children cannot be considered either valid or reliable, it is important to inquire into the relation between the adult's and the child's writing vocabularies insofar as the latter is known. Under present conditions, the most practical inquiry concerns the degree of overlapping that exists between the five thousand words found to be used most commonly and frequently by adults, and the words found in the second series of theme studies and in the investigations of children's letters. Such a comparison shows that fewer than 900 words among the first 5,000 of the adult list are not found in the children's list. The vast majority of these 900 words are those used frequently in business correspondence. Fewer than 600 words with a frequency count of ten or more in the children's list are not found among the first 5,000 words of the adult list. Very few of these words, moreover, were used by children with high relative frequency. Obviously, then, there is a great amount of overlapping between the two vocabularies.

While it is impossible to anticipate accurately what results will be obtained when a valid and reliable comparison is made, existing data indicate that the following general conditions probably will be found. First, there will be a small list of words of considerable importance in the writing of children that are not of great importance in the writing of adults. These will be the child's present spelling needs only; they cannot be considered as part of his permanent spelling needs. Second, there will be a relatively small list of words of great importance in the writing of adults only. These words will be part of the child's permanent spelling needs, but they will not be found frequently in his writing during the first eight years of school unless writing activities are arbitrarily set up to include them. Third, there will be a large group of words — probably at least three thousand — that are of great importance in the writing of both children and adults.

In considering this comparison it is important to understand how

the data from these investigations bear upon the selection of the words that are the most important to teach. The basal spelling list for the elementary school should consist of only those words that represent *both* present and permanent needs. There will be plenty of words in this list to keep most children busy for eight school years. The words that meet present needs only should either be learned incidentally as the need for them arises, or they should be presented as a supplementary list. The words that meet future or permanent needs only will present a slightly different problem. Because all these words are of great importance in writing done during adult life, and because many pupils leave school at the close of the eighth grade, it is quite possible that many of these words should be taught in the upper grades, regardless of the fact that they are not used frequently by children in the writing they do during the first eight grades. This is particularly true if the teaching at these levels is skillful enough to enable the pupil to understand how crucial it is that he know how to spell these words. It should be remembered also that when the course of study in written composition for the intermediate and upper grades becomes what it should be, and when the teaching of content fields encourages writing on current social and economic problems, the overlap between the writing vocabulary of adults and that of children will be materially extended.

2. Which Important Words Can Be Omitted from the Course of Study?

Although available data are very meager, two approaches have been made in determining which words among those of greatest importance are of such little difficulty that they may well be omitted from the course of study. By means of testing, some of the studies on the spelling difficulty of a word have gathered data pointing to words that are seldom misspelled by children at any grade level above the first.¹ Other studies, more promising in nature, have attempted to discover which important words are learned as a by-product of the teaching of composition, reading, and other subjects.² More investigations of this type are needed.

¹ See footnotes in a following section listing typical studies of spelling difficulty.

² For example, see E. Standing. "The Effect of Reading in the Primary Grades upon Spelling." (Master's thesis University of Iowa, Iowa City, Iowa, 1929)

II. DISTRIBUTING THE WORDS TO BE TAUGHT AMONG THE VARIOUS GRADES

In order to determine adequately the spelling needs of any grade in terms of child development, at least two major criteria must be applied. These are: (1) to be included in the spelling course in a given grade a word should be used by children in the writing done in that grade (this assumes, however, that the writing itself will be appropriate to the needs of children); (2) to be included in the spelling course in a given grade a word should have permanent value. There are other factors that must be given consideration, both in planning the course of study by grades and in determining the arrangement within the grades. Among these factors are the difficulty with which the words are learned and logical sequence, as illustrated in the building of derived forms from base words.

1. Data on the Child's Present Needs

In determining grade placement of spelling vocabulary in terms of child usage, at least three sources of data should be used. Information on the words children at a given grade level use most commonly and frequently in writing should be employed. The spoken vocabulary of children should also be utilized. In addition, careful consideration should be given to the child's present and permanent reading vocabulary. While the first of these three sources is possibly the most fundamental, no mere matching of the child's writing vocabulary with his permanent spelling needs can in itself produce adequate grade placement in terms of child usage.

As indicated in the preceding section of this chapter, many more data are needed before careful grade placement in terms of child usage in writing can be accomplished. At the present time, many data have been collected at the fifth- and sixth-grade and secondary-school levels.¹ A fair amount exists at all other levels except the first two. Data on the writing vocabulary of first- and second-grade children are very meager. Information on spoken vocabulary is available only at the first-grade level.² The best index of present reading vocabulary lies in reading

¹ Data at the junior- and senior-high-school levels are found in E. J. Ashbaugh. "The Vocabulary of Secondary School Pupils' Spontaneous Letters." (Unpublished study. Miami University, Oxford, Ohio)

² For example, see: (a) M. D. Horn. "The thousand and three words most frequently used by kindergarten children." *Childhood Education*, 3: Nov., 1926,

word lists for the different grades.¹ The Thorndike list is the best, and, indeed, the only measure of permanent reading vocabulary.² Obviously, accurate grade placement of spelling vocabulary in terms of the child's present use of the word cannot yet be made with confidence. It must be kept in mind, moreover, that the range of spelling ability and of writing needs in any grade is very wide, and that in both these respects the children of any grade are more like than unlike the children of adjacent grades.

In general it would seem that if spelling is to be taught at all in the first grade, the words constituting the list for that grade should be words that possess both permanent and present value for the first-grade child. On account of the lack of data on the writing vocabulary or the reading vocabulary of children entering the first grade, evidence on probable child usage must be taken from investigations of the spoken vocabulary of young children. Such studies have shown that the number of words used commonly and frequently by children entering the first grade is undoubtedly upward of twenty-five hundred words.³ When these data are compared with the first five thousand words most frequently written by adults, there are more words common to both lists than could possibly be taught in any first grade. The most important of these words are appropriate for the first grade. It is generally agreed, however, that the list for first-grade spelling lessons, if spelling is to be taught, should be very short. Any word needed by the children but outside the short list should be taught as the need for it arises.

Similar suggestions can be offered for grade placement in terms of child usage at each grade level from the second to the sixth grade, inclusive. The lists for any one of these grades should be composed of words that represent both present and permanent needs for children in that grade. Again, because of insufficient data on the writing vocabulary, probable child usage in the second and the third grade must be inferred from evidence as to the writing vocabulary of children in

118-122; (b) M. E. Smith. "A study of some factors influencing the development of the sentence in preschool children." *Pedagogical Seminary and Jour. of Genetic Psychol.*, No. 46, March, 1935, 182-212.

¹ For example, see: A. I. Gates. *A Reading Vocabulary for the Primary Grades*. (New York: Bureau of Publications, Teachers College, Columbia University, 1935)

² E. L. Thorndike. *A Teacher's Word Book*. (New York: Bureau of Publications, Teachers College, Columbia University, 1931)

³ For example, see: M. E. Smith. *Op. cit.*

adjacent grades, and from the present reading vocabulary at the second- and third-grade levels. While the data on the writing needs of children in the intermediate grades are sufficient to determine the great majority of words for these grades with considerable confidence, many marginal words will have to be selected on the basis of data on the writing vocabulary of children at higher levels. In any grade, any word not included in the basic list should be taught as the need for it arises in connection with other school activities.

It has already been pointed out that the problem of determining the spelling curriculum at the seventh- and eighth-grade levels is somewhat different from the problem of determining it for the first six grades. The new words for these higher grades will be selected on two bases: (1) the words in the area of overlap between the vocabulary needs of adults and children in these grades, and (2) words of crucial importance in adult writing that the pupil at present does not use. The relative importance to be assigned to each of these two bases of selection is a matter of opinion. In addition, there should be special provision for the review of words that, although studied in previous grades, show persistent difficulty in succeeding grades. Any other words the children need should be taught as the need for them arises.

2. Data on the Extent and Nature of the Difficulty of Words

A large number of investigations have borne on the problem of spelling difficulty. In one group of studies data were gathered on the difficulty of individual words at different grade levels by determining the percentage of children at a given grade level who were not able to spell a given word. Some of these studies embodied a testing procedure;¹ others present data collected by analyzing children's writings.² A second group of investigations produced data on the types of spelling errors and difficulties occurring at different grade levels.³ A small group

¹ Typical studies are: (a) L. P. Ayres. *A Measuring Scale for Ability in Spelling*. (New York: Russell Sage Foundation, 1915); (b) E. J. Ashbaugh. *Iowa Spelling Scales*. (Iowa City: State University of Iowa, 1919)

² Typical studies are: (a) J. A. Fitzgerald. *Op. cit.*; (b) "The 1035 Words Most Commonly Misspelled by Minneapolis Pupils in Grades 3 through 8." (Research Department, Public Schools, Minneapolis, Minn., 1927)

³ Typical studies are: (a) L. Hollingworth. *Special Talents and Defects*. (New York: The Macmillan Co., 1923); (b) W. F. Book and R. S. Harter, "Mistakes which pupils make in spelling." *Jour. of Educ. Research*, 19: Feb., 1929, 106-118.

of investigators attempted to collect data pertaining to the relative difficulty with which words are learned.¹

It seems reasonable to assume that for purposes of either grade arrangement or method, as influenced by difficulty, the fundamental information needed is that which will show the nature and extent of the difficulty with which a word is learned at different grade levels.

Although the studies in the first of the three groups just referred to show that there is a decrease in the spelling difficulty of a given word as the grade level advances, they do not show how hard a given word is to learn at any grade level. Nevertheless, data obtained from these investigations have been widely used in determining the grade placement of words. Obviously, such a procedure is better than a mere guess, even though no one knows to what degree the spelling difficulty of a word, as determined by these studies, and the learning difficulty of that word are correlated. It is unfortunate, too, that the published investigations on spelling difficulty do not supply data on many words that should be taught in every school, while at the same time they provide information on many words that are not important enough to be included in the course of study. Investigations on spelling difficulty are significant for purposes of method and grade placement only to the degree to which they deal with words that are important to learn.

The studies in the second group dealt with analyses of errors at different grade levels, including such matters as types of errors, persistency of type difficulties, hard spots, phonetic difficulties, and the like. While the data show that many types of errors occur at practically all grade levels, and that the number of different ways of misspelling a given word decreases as the grade level advances, they are concerned more with problems in method than with the problem of grade placement. Closely related to these studies, however, are the important data recently reported by Gates.² Among other things, he collected information on the comprehension of various words by chil-

¹ Typical studies are: (a) F. A. Ogle. *A Study of Spelling Difficulty*. (Field Study No. 1. State College of Education, Greeley, Colo., 1933); (b) J. H. Haynes. "Relative Learning Difficulty of Words in Spelling." (Master's thesis. State College of Education, Greeley, Colo., 1935); (c) E. Dick. "Learning Difficulty in Spelling at the Fifth-Grade Level." (Master's thesis, State College of Education Greeley, Colo., 1936); and (d) P. C. Rogers. "Words in Spelling, Grade for Grade, That Fail to Stick." (Master's thesis. State University of Iowa, Iowa City, 1924)

² A. I. Gates. *A List of Spelling Difficulties in 3876 Words*. (New York: Bureau of Publications, Teachers College, Columbia University, 1937)

dren at different grade levels. More data of this type should be gathered.

There are a few investigations dealing directly with the nature and extent of the difficulties manifested by children in learning various words. In most instances, however, the investigations were not well controlled, particularly in the matter of method of learning, which is most important. What are needed, of course, are data regarding the difficulties that confront pupils when the methods are as good as modern knowledge can make them.

This discussion of the grade placement of spelling vocabulary in terms of difficulty should not be closed without stating that, after all, it is the child's need for the word, rather than any type of difficulty attached to the word, that constitutes the basal factor in determining grade placement. For example, if we really propose to teach children the words most likely to be used by them in the writing that they do, *Halloween*, although difficult, must be taught not later than Grade III, because it occurs very frequently in the writing done by young children both in and out of school. An even more extreme example is the word *stationery*, which is frequently misspelled even by eighth-grade children, but is found with high frequency in the letters written by children in the third, fourth, and fifth grades.

III. SUMMARY

In making a summary statement of what should be done in order to facilitate the development of ability in spelling, the following conclusions seem to be especially significant and warranted by the evidence in this field.

1. The course of study in written composition must be put on a sound basis. Children should learn what types of social situations demand writing and should become proficient in the type of writing the situations require. For example, in the studies of letters written by children on their own initiative in life outside the school, letters of condolence or expressions of gratitude for kindnesses are conspicuous by their absence. Children are not likely to learn to write such letters, excluding the spelling of words in them, unless they become sensitive to the need for such letters and habituated to the practice of writing them. The use of words in natural situations not only motivates the learning of spelling, but also maintains the abilities developed in the spelling period.

2. The basal word list in any grade should be composed of words

that represent both the present needs of children in that grade and their probable permanent needs. However, some words, especially crucial in future writing, though little used by children, may be included in the list in the upper grades.

3. Any word not appropriate for the basic list according to the foregoing criteria, but which the child needs in connection with other school work, should be taught when the need for it arises.

4. Special significance must be attached to the fact of individual differences in spelling needs and ability. The basal list of words should be made up from those words commonly needed by the great majority of children. But in addition adjustments to individual differences should be made; first, through the use of methods that provide for individual differences; and second, by the development of the ability of all children to learn, when needed, any word not included in the basal list.

5. Although more extensive and refined investigations are needed in this field of child usage, practical decisions as to the grade arrangement of words in spelling can be made with a degree of error that is probably smaller than that which exists in the grade arrangement of any other school subject.

CHAPTER XIII

LANGUAGE: THE DEVELOPMENT OF ABILITY IN HANDWRITING

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I. THE DEVELOPMENT OF MOTOR SKILL IN GENERAL

All the studies, both of handwriting itself and of motor skill in general, show beyond question that there are marked changes as the child grows older. It is not possible to distinguish between the change due to maturation and that due to practice in general activity or in the specific act of handwriting; but whatever the source of the change, it must be given due weight in organizing instruction in writing.

The development of motor skill has been traced in many studies of speed of movement, accuracy of movement, steadiness, and reaction time. All these studies show a marked and continuous gain, which is somewhat more rapid up to the beginning of adolescence, at about twelve years of age, than during the adolescent period. The older studies by J. A. Gilbert,¹ based on one thousand school children, and by W. L. Bryan² give the essential facts as well as any later studies.

II. THE DEVELOPMENT OF THE HANDWRITING MOVEMENT

Studies of the handwriting movement itself also reveal notable changes with age. Some of these studies deal with the basic characteristics of the movement as revealed by an analysis of changes in pressure and speed throughout the writing stroke or of the elements of which the total movement is composed.

¹ J. Allen Gilbert. "Researches on the Mental and Physical Development of School Children." *Studies from the Yale Psychological Laboratory*, Vol. II, pp. 40-100. (New Haven, Connecticut: Yale University, 1894)

² W. L. Bryan. "On the development of voluntary motor ability." *Amer. Jour. of Psychol.*, 5: 125-204.

1. Uniformity

An analysis by Freeman¹ of changes in both pressure and speed shows that the child's writing movement is more irregular or variable than that of the adult. Given strokes come to be made with more nearly uniform pressure and speed as the writer attains maturity and skill. In fact, uniformity is one characteristic of skill and maturity.

2. Continuity

Besides uniformity, the writing movement gains continuity and organization with maturity. An early German investigator, E. Meumann,² points out that the older person writes a letter or a word with more of a "total impulse" than does the child. That is, the child writes each stroke with a separate impulse, as indicated by the fact that he reduces the pressure between strokes. The adult, on the other hand, carries a more uniform pressure through both letter and word. The same fact was found by Freeman³ and William H. Gray⁴ to be true of changes in speed. Both investigators found that the child makes longer pauses between strokes than does the adult. The adult writes with a more continuous movement, showing that he writes letters and words as units, whereas the child writes them as a series of more nearly separate strokes. This difference suggests that *manuscript writing*, which consists of separate strokes, is suitable for young children and that cursive writing, which permits words to be written as units, is better for older children and adults. It also indicates that originality or individuality, which develops in later childhood or youth, may be partly a matter of the total form of words. The conclusion that cursive writing is better for adults is a controversial one. Washburne and Morphett, for example, give data to show that adults may write the

¹ Frank Nugent Freeman. "Experimental Analysis of the Writing Movement." *Yale Psychological Studies*, Vol. II, No. 1, pp. 1-46. (Psychological Monographs, No. 75. Princeton, New Jersey: Psychological Review Co., 1914)

² E. Meumann. *Vorlesungen zur Einführung in die Experimentelle Pädagogik*, Vol. III, Chap. XVIII.

³ Frank N. Freeman. *The Handwriting Movement*. Supplementary Educational Monographs, No. 9. (Chicago: Department of Education, University of Chicago, 1918. 169 pp.)

⁴ William H. Gray. "An Experimental Comparison of the Movements in Manuscript Writing and Cursive Writing." (Unpublished doctor's thesis, Department of Education, University of Chicago, 1929. 123 pp.)

manuscript style as rapidly as the cursive style.¹ However, in this case no comparison was made of the form or quality, and Gray's study² suggests that when manuscript writing is speeded up in adult writing it may lose its distinctive merit of legibility and clarity of form. This question awaits further investigation.

3. Rhythm

Akin to the development of greater uniformity and unity is the growth in rhythm. This has been discovered in studies by M. K. Smith,³ D. Awramoff,⁴ Freeman,⁵ and H. W. Nutt.⁶ All four studies agree that writing becomes more rhythmical as the child grows up. This is doubtless related to the tendency toward writing from a total impulse — as each letter or unit in a letter, such as a loop, comes to be written as a whole rather than as a succession of separate strokes, successive letters or units come to be written in more nearly equal units of time. The time taken to write such a unit is determined not merely by its individual characteristics, such as its length or size, but also by the fact that it is a unit in a succession of movements, all of which tend to be made in equal intervals of time. The rhythmic succession of movements tends to impose its limitations on each unit that is a part of it. This tendency not only affects the time in which the unit is written but also modifies, in some measure, the form of the unit, so that it may fit better into the time limitations. This is one of the features of the maturing process.

4. Special Form of Movement

One other feature of the developing movement has to do with the acquisition of a special form of movement that is imposed by means of special instruction. The special form of movement is arm movement or muscular movement. The study on this point does not indicate that

¹ Carleton Washburne and Mabel Vogel Morphett. "Manuscript writing — Some recent investigations." *Elem. School Jour.*, 37: March, 1937, 517-529.

² William H. Gray. *Op. cit.*

³ M. K. Smith. "Rhythmus und Arbeit." *Philosophische Studien*, 16: 1903, 71.

⁴ D. Awramoff. "Arbeit und Rhythmus." *Psychologische Arbeiten*, 18: 1903, 515-562.

⁵ Frank Nugent Freeman. "Experimental Analysis of the Writing Movement." *Loc. cit.*

⁶ H. W. Nutt. "Rhythm in handwriting." *Elem. School Jour.*, 17: February, 1917, 432-445.

arm movement would become more prominent when the writer is left to develop his own style. It does indicate, in the experiment made by Nutt,¹ that when the pupil is required to learn to use the arm movement, he does so only gradually. In other words, when the exclusive arm-movement system is taught, pupils acquire it only gradually. Those in the first grade use little arm movement, those in the second grade a little more, and so on. This indicates that arm movement is difficult to acquire, is unsuitable for young children, and, if it is taught at all, should not be emphasized until the pupil has acquired a fair degree of motor skill, probably in the intermediate grades.

III. MEASURING IMPROVEMENT IN SPEED AND QUALITY

The advancement in ability may be measured by testing the speed and quality of handwriting itself as well as testing general motor dexterity. Many surveys of handwriting in the elementary school show a steady gain in speed and quality throughout the eight grades. The growth curves in the two aspects vary from city to city or from school to school according to the emphasis given to them. The general trend, as represented by test papers secured from fifty-six cities, was reported in the *Sixteenth Yearbook* of this Society. The gains by grades from the second to the eighth were found to be as shown in Table I.

TABLE I.—GAINS IN SPEED AND FORM FROM GRADE TO GRADE

Grades	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	Total
Speed	13.2	7.4	7.9	3.7	5.1	5.1	42.4
Form	4.3	6.3	4.5	6.5	5.7	3.5	30.8

It appears that the greater gains in speed are made from the second to the fifth grades, and that the greater gains in form are made from the third to the seventh grades. The general tendency, then, is for rapid gain in speed to begin before rapid gain in form. There is doubtless another period of rapid gain in speed after the eighth grade, since the average speed in the eighth grade, seventy-three letters per minute, is much exceeded by students in the high school and the college, but accurate data on this point are not available.

The relative gain in speed and form varies in different school systems. In the report of the survey of the schools of the city of St. Louis²

¹ *Loc. cit.*

² Frank N. Freeman. "Handwriting." *Survey of the St. Louis Public Schools*, Vol II, Part 6, pp. 223-224. (St. Louis, Mo.: Board of Education, 1917)

a marked contrast was shown between the relation of these two features in that city and in Grand Rapids. In St. Louis the chief gain in speed was made in the first four grades and the chief gain in form, in the remaining grades. In Grand Rapids, on the contrary, the gain in speed and form was more nearly balanced throughout the grades. The mere fact of difference does not indicate that either is better than the other, though as a matter of fact the St. Louis children wrote somewhat more legibly and somewhat more slowly than the Grand Rapids children at the close of the elementary-school period. Which should receive chief emphasis in the early grades is a matter for further investigation.

IV. THE ATTAINMENT OF AN INDIVIDUAL STYLE

In addition to the measured gains in speed and quality there is another change, equally real, but not so easily measured. We may call this change the attainment of individuality or of maturity of style. It has already been pointed out that the writing of older persons becomes more regular, unified, and rhythmical in terms of the pressure and speed of the writing stroke and that this change is accompanied by corresponding changes in the form of letters or words. This change lies outside the scope of present instruction and takes place without intention or guidance on the part of either pupil or teacher. It should doubtless be recognized as a form of development to be encouraged and directed.

V. SUMMARY AND COMMENTS

The foregoing account has reviewed the facts of the development of handwriting and of manual dexterity as revealed by scientific investigations and has included a few inferences concerning curriculum and methods in the teaching of the subject. The major fact is that manual dexterity develops slowly and that a complex form of skill like handwriting is a slow growth. The actual attainment of skill in writing is, of course, the result of a combination of maturation and practice. Less practice would probably be required if the beginning of practice were deferred. On the other hand, a fair degree of skill can be attained in the primary grades if the type of writing and the requirements of speed and quality are adapted to young children's ability. Manuscript writing in the first two grades has been found to make the beginning of writing easier.¹

¹ Frank N. Freeman. "An evaluation of manuscript writing." *Elem. School Jour.*, 36: February, 1936, 446-455.

Formerly it was generally held that sufficient skill in writing could be reached by the end of the sixth grade. This conclusion was based on the fact that the average attainment of the sixth grade in terms of quality on a handwriting scale is equal to the requirements of the non-vocational writing of adults. This conclusion is now being questioned on two grounds. First, the average speed of writing at the sixth grade is not adequate for use in the junior and the senior high school. Second, the writing of the sixth-grade pupil is not yet mature. Owing to the pressure for greater speed and to the lack of maturity, it is commonly reported that the writing of junior- and senior-high-school pupils deteriorates. To prevent this deterioration, some form of instruction or guidance in writing should be continued throughout the junior-high-school years, and possibly into the senior high school in the case of the poorer writers.

On the practical problem as to when instruction in handwriting should begin there is some difference of opinion, but no known direct scientific evidence. Some educators believe that the average first-grade child is not yet ready to learn to write. Many changes in style of writing and method have been made during the past twenty-five years to make the initial stages of learning to write easier, including blackboard writing, using a larger style, writing with crayons or soft lead pencils, employing a combined movement instead of muscular movement, and, finally, beginning with manuscript writing. Whether these changes make writing sufficiently easy for the first-grade child can be judged, at present, only on the basis of observation.

A special question may be raised as to whether the left-handed child should begin later than the right-handed child, since writing is somewhat more difficult for him. This greater difficulty must be balanced against the disadvantage of singling out a few children for special treatment. No experimental evidence exists on this point.

CHAPTER XIV

FOREIGN LANGUAGE¹

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I. INTRODUCTION

What is the best time to begin the study of a foreign language? Can younger children learn it more readily, as readily, or less readily than older children? As Bagster-Collins (2) shows, historically, foreign languages have been introduced at one time or another in all grades from the elementary school to the college. Which of these levels is the best? To answer such questions as these, it is necessary to consider several basic problems that are discussed here under the following categories: ² (a) factors affecting student achievement in foreign language study (under II, following); (b) five objectives proposed by the *Modern Language Study* (under III); (c) experimental evidence on the optimal time for beginning study of a foreign language (under IV and V); ³ and (d) research needed to give more conclusive evidence as to the time to initiate foreign language study (under VI). A brief summary (under VII) concludes the chapter.

II. FACTORS AFFECTING STUDENT ACHIEVEMENT IN FOREIGN LANGUAGE STUDY

Maturity is but one factor that affects student achievement in foreign language study. Of equal importance are such factors as the

¹ The authors acknowledge their obligation to Professor Algernon Coleman, of the University of Chicago, who furnished some valuable references.

² In determining the age or grade location for beginning the study of foreign language, the relative value of the subjects it would presumably replace ought also be taken into account.

³ Because the optimal time has not been investigated separately in the case of Objectives 2 and 5, the evidence relating to them is presented as a unit (under V).

objectives, the materials and methods used in study, the quality of teaching, and the general standards of the school and community in question. Accordingly, the problem of optimal age or grade for beginning foreign language study is not solved by merely determining the relative efficiency of learning the language at different age or grade levels — difficult and complex as this problem may be. The other factors must be taken into account. Obviously the student who is learning to read by the reading method must have at his disposal a large amount of reading material that is both interesting and not too difficult. If the reading material is sufficiently diversified to allow for the individual differences of the students, better results may reasonably be expected. If the objective is to develop the ability to speak, a teacher who had interesting pictures and other accessories at her disposal may be expected to obtain better results than one who lacks this equipment. While controlled experiments have not been made to prove the effect of individual school and community standards, their influence on language study seems obvious by implication.

III. THE OBJECTIVES OF FOREIGN LANGUAGE STUDY

The objectives of foreign language study in the United States were first definitely formulated by the *Committee of Twelve* in 1898 (21). This Committee recommended four objectives: *reading, writing, speaking, and understanding*. Of these, it selected *reading* as the one most appropriate for students who wished to study a language for only two or three years. If a language was to be studied for a longer period of time, the other objectives might be striven for. Although the Committee stressed the importance of developing an ability to read at sight and recommended that all language activity be made subservient to this objective, it actually outlined its courses of study with the obvious purpose of meeting college entrance requirements (7, p. 142). Teachers generally, however, followed the courses of study thus outlined rather than the reading objective recommended by the Committee.

The reading objective was reëmphasized through the publication of the *Modern Language Study* during the years from 1924 to 1934, especially by the *Coleman Report* (7) of 1929, which described the objectives of foreign language study as follows: —

Progressive Development:

1. Of the ability to read books, newspapers, and magazines in the modern language within the scope of the student's interests and intellectual powers.

2. Of such knowledge of the grammar of the language as is demonstrated to be necessary for reading with comprehension.
3. Of the ability to pronounce correctly, to understand and to use the language orally within the limits of class materials.
4. Of a knowledge of the foreign country, past and present, and of a special interest in the life and characteristics of its people.
5. Of increased knowledge of the derivations and meanings of English words, of the principles and leading facts of English grammar and of the relationships between the foreign language and English (7, p. 107).

IV. WHAT IS THE OPTIMAL AGE OR GRADE FOR INITIATING FOREIGN LANGUAGE STUDY TO ACCOMPLISH THE READING OBJECTIVE?

Most of the investigations of the best time to begin foreign language study do not report data separately on each of the objectives. Some of them do, however, especially in the case of the reading objective that was given so much emphasis in the *Coleman Report*.

Cheydleur (5) compared the achievement in French (as measured by the American Council Alpha French Tests) of two groups: (a) thirty-nine adults, ages eighteen to sixty-two years, and (b) fifty-four college freshmen, both taught by the same teacher, using the same methods and essentially the same materials. The American Council Psychological Examination scores (first, second, and third quartiles) of the freshmen were somewhat higher than those of the adult group. By the end of the second semester the adult group had received a maximum of 84 hours of instruction and the University freshmen, of 128 hours. The mean score of the adult group was 58.2, and of the freshmen 50.7. The standard error of the difference between the means indicates a probable difference in favor of the adults 97 times in 100. Cheydleur attributes this difference, not to the adults having greater leisure, but to "better motivation, application, and concentration," which may enable the adult to "outstrip his younger brother in college with less clear-cut aims, industry, and singleness of purpose." Obviously, unless all factors save age, intelligence, or maturity be controlled, we cannot know the effect of such a factor.

Buswell (4) carefully selected average students from the fourth and fifth grades, the first and second years of the high school, and the first and second years of the college, using in these six groups 12, 12, 12, 14, 14, and 8 persons, respectively. All had received French instruction. He also used some adults who had studied and taught French and were mature readers of the language. He photographed their eye-movements

while reading the vernacular and while reading several selections of French to see if any differences could be found in maturity of habits of eye-movements. He concludes "that in a period of two years elementary pupils do not attain that degree of maturity in reading which is attained during a like period in approximately equal measure by high-school and college students." We should note also that in reading simple material in English these same elementary pupils showed "approximately the same type of mature reading habits as is shown by the older groups." No notable differences in maturity of fundamental reading habits resulting from two years' study of French were observed between those beginning it in the high school and those beginning it at the college level.

However, Eurich (8) found little relation between photographic records of eye-movements of college students and their scores on several reading tests (see also 11). Buswell gives no report on differences in comprehension in reading French of those who studied it at these various levels.

Spink (24), using twelve French paragraphs selected and arranged to make an oral reading test similar to Gray's Oral Reading Paragraphs, studied the achievement of children in Grades IV to VII. She also used the American Council Alpha French Test with some of them. She notes an advantage of beginning French early; *viz.*, that the pupils' interest in French is more permanent. Reading was the chief aim of the course. She says:

Since the ability to read French is developed without consciousness for form and structure, the children do not develop the grammar inhibition which has usually hampered young pupils and has limited their acquisition of French to a few forms beyond which their immaturity prohibited progress. When they are trained without inhibitions, children learn to read French within the scope of their experience almost as naturally as they read English. . . . Reading is a much more valid objective for the elementary-school period than is the acquisition of a knowledge of the structure of a language.

The evidence offered by Spink on permanence of interest is not entirely conclusive, and the relative effectiveness of beginning to study the language in earlier or later grades, with all other pertinent factors held constant, is not considered. Then too, students in the University of Chicago Elementary School are highly selected in many ways.¹

¹ See a later page for an account of DeSauzé's investigation, showing that pupils beginning French in Grades VII, VIII, and IX were able to read the lan-

V. WHAT IS THE OPTIMAL AGE OR GRADE FOR INITIATING FOREIGN LANGUAGE STUDY AS SHOWN BY INVESTIGATIONS OF INSTRUCTION WHICH ATTEMPTED TO REALIZE MORE THAN ONE OBJECTIVE?

Each of the other available experimental studies involves two or more of the objectives of the Coleman *Report*, usually without clearly differentiating between them.

1. The Best Chronological Age or Grade for Beginning the Study of a Foreign Language

As has been pointed out repeatedly in this volume, many considerations have to be taken into account in placing topics, activities, or materials of instruction at any grade or year in school. Maturity or the maturity represented by age, grade, or intelligence-test scores is only one of these determinants. On the basis of the investigations bearing on the problem (to be discussed in some detail presently) that we have found in the literature, we may conclude that if some combination of several of the objectives listed is sought, students probably should not begin the study of a foreign language before the seventh grade, and that the efficiency of learning will be greater if the instruction is postponed until the senior high school or even until the college.

To be sure, children can learn a foreign language before that time, especially a modern foreign language. Many have done so. Children in the elementary grades of the Laboratory Schools at the University of Chicago have learned a great deal both in French and German. The location of beginning instruction in these languages at the elementary-school level has been defended by Schmidt (23) on the ground that pupils, because of the longer time spent upon the language, "have a better developed *Sprachgefühl* and that their mastery of the language is such that they enter more into the spirit of the books read, see the finer points of style, and get more enjoyment out of the work than do the pupils who begin the study of the language at a later age;" *i.e.*, after entering the high school. Although modern language teachers commonly hold the view that pronunciation probably can be developed more rapidly at these early ages (at least this is a commonly held view of modern-language teachers), we have found no conclusive evidence to confirm the assertion. We must note, however, as shown in Section III of this chapter, that the emphasis upon objectives in foreign lan-

guage with approximately equal effectiveness, and that those beginning it in Grade XI read it *much more effectively*.

guage instruction has changed greatly during the twenty years that have elapsed since Miss Schmidt set forth the view quoted above.

We should note, also, that American students study a foreign language only a very short time. According to Cole (6, p. 16): "The foreign languages in the public schools are essentially one- and two-year subjects. For about 83 percent of those who begin modern language in the public and private secondary schools, two years is the maximum period of study." Further data on this point are to be found in the report by Wheeler (27, esp. pp. 352-355).

To be more specific, let us examine some of these investigations that deal with the optimal age or grade for initiating instruction in a foreign language.

Thorndike (26, pp. 269 and 46) investigated the gains made on standardized tests in French, German, Latin, and Spanish by students in two large evening high schools. In all, 886 students were tested. Those at ages 20 to 24 years made the greatest gains after allowance was made for differences in intelligence scores, attendance, and reported home study. Using the age-span 20-24 as the basis of comparison and representing it as 100, the gains were as shown in Table I.

TABLE I.—GAINS EXPRESSED AS PERCENTS OF GAINS AT AGES 20 TO 24 YEARS
(After Thorndike)

	<i>Ages: 14-16</i>	<i>17-19</i>	<i>20-24</i>	<i>25-29</i>	<i>30 and over</i>
French	59	86	100	89	86
German	56	82	100	87	83
Latin	65	87	100	91	88
Spanish	71	89	100	92	90

In another study Thorndike compared the gains of small groups of individuals at various ages from eight to forty-two years in learning Esperanto for periods varying in length from four hours to forty-six and one-half hours. Exactitude in pronunciation was not tested. Pupils 9 to 18 years old learned approximately one-half as much as the group 35 years old and over, although they had much more class study and probably a great deal more home study. Those at ages 9 to 11 years showed still lower rates of gain, although some of them were of very high intelligence. Thorndike (26, p. 46) believes "that the superiority of adults would be somewhat less in learning a natural language, abounding in irregularities which must be mastered largely by sheer habituation. But we are convinced," he says, "that the gain

made in fifty or a hundred or five hundred hours of study of French or German or Italian or Spanish or Latin by a group of any age from 20 to 40 will be greater than the gain made by a group aged 8 to 10 or 12 of equal native capacity."

Frazier and Crawford (10) compared the achievement in Spanish of fifty junior-high-school students and fifty adults in evening school. Half of each group had completed first-semester Spanish and half, third-semester Spanish. The intelligence quotients of the junior-high-school group ranged from 112 to 147; those of the adults were not available, but it is reasonable to suppose that they were somewhat lower. The total time of instruction was the same for both groups, but the distribution of class time favored the younger group. Comparison of the scores on the Stanford Spanish test (grammar, vocabulary, and paragraph meaning) showed uniform and clear-cut superiority of the adult group in the abilities measured.

An unpublished doctoral dissertation at Yale by Li (19) presents data on the relative achievement of pupils in the junior high school and the senior high school who had studied French for the same length of time. Some began the subject in the first semester of the ninth grade, some in the first semester of the tenth and eleventh grades. More than 500 pupils were tested after one semester of French begun, as above noted, in the first semester of the ninth, tenth, and eleventh grades, respectively. Smaller numbers were tested after two, three, or more semesters' study of French. Presumably general objectives were stressed.

Henmon, (13, p. 326) in referring to this study, notes that "a recognizable tendency for those beginning in the tenth and eleventh grades to secure higher median scores than those beginning in the eighth or ninth grades is evident, but there are too many unanalyzed variables to justify drawing a conclusion in favor of late beginning of modern language study." Not only are senior-high-school students a more highly selected group than the junior-high-school group, but many of them doubtless had also studied Latin previously and knew somewhat better how to study a foreign language. Then, too, probably variations in objectives at different grade levels, as well as variations in content, methods, quality of instruction, and the like make the results inconclusive. We have estimated the variabilities and computed the standard errors of differences between the mean scores of these groups on the American Council Alpha French Tests and find that, by even a very conservative estimate of the variabilities, the standard errors of the

differences in means indicate that the differences lie well within the realm of chance.

Li's study of relative achievement in German begun in the ninth, tenth, and eleventh grades also does not warrant any conclusion on the effectiveness of early versus late introduction to that language.

DeSauzé (13, pp. 326-329) gave the American Council Alpha French Test (Form B) to 750 pupils in nine high schools in Cleveland at the end of one semester of French. These pupils comprised four groups — those beginning the study of French the second semester of the seventh grade, and those beginning it the first semester of the ninth, tenth, and eleventh grades, respectively. The I.Q.'s cannot be compared directly because the seventh-grade group took the Cleveland Classification Test (median I.Q. 112), whereas the other groups took the Terman Group Test of Mental Ability (median I.Q. being 103, 103, and 106, respectively). As shown in Table II, in vocabulary, grammar, and composition the seventh-grade group was distinctly inferior to the other three groups, whereas in silent reading the differences were very slight between Grades VII, VIII, and IX. However, the differences were significant between these grades and Grade XI.

Here, too, many important factors were not controlled. The study represents results under a particular set of actual school conditions, but we cannot conclude that the results would have been similar if methods, content, motivation, time devoted to instruction and to study had been equal.

Finch and Floyd (9) gave the American Council French Tests to pupils in the University of Minnesota high school after one, two, and three years' study of the language. Chronological ages ranged from 11 to 19 years, and I.Q.'s (on a composite of scores from five group tests) from 119 to 122. Chronological age seemed to be a relatively unimportant factor in determining achievement in French for this group, because the correlations, on the average, were low and positive. They were too low to yield an accuracy of prediction adequate to answer the question, "At what chronological age should the student begin the study of French?"

2. I.Q., or Mental Ability, as a Basis for Determining When to Introduce a Foreign Language

The studies purporting to show the mental ability necessary to learn a foreign language are not conclusive because the relations usually are determined at a specified grade level. Thus Jordan (14) found,

TABLE II.—COMPARISON OF SCORES IN FOUR ASPECTS OF FRENCH MADE BY FOUR GROUPS OF PUPILS
IN CLEVELAND HIGH SCHOOLS
(After DeSauzé, quoted by Hemmon)

	Vocabulary				Grammar				Silent Reading				Composition			
	7 ² *	9 ¹	10 ¹	11 ¹	7 ²	9 ¹	10 ¹	11 ¹	7 ²	9 ¹	10 ¹	11 ¹	7 ²	9 ¹	10 ¹	11 ¹
N	267	226	82	174	233	225	83	184	231	225	60	152	211	178	73	123
Med.	9.4	15.3	11.7	12.9	3.3	6.5	6.7	7.0	1.4	1.6	1.8	2.6	3.7	4.9	5.6	5.3
Mean	11.7	15.9	12.0	13.2	3.1	6.3	6.4	6.5	1.6	1.6	1.6	2.6	3.4	4.8	4.9	5.1
P.E.																
Diff.					.39	.51	.53	.15	.21	.23	.12	.15	.17	.13	.19	.20

* 7² means second semester of seventh grade; 9¹ means first semester of ninth grade, etc.

on the basis of 108 high-school students' records, that a pupil's chances of doing satisfactory work in foreign language were about 80 in 100 if his I.Q. was over 100 (Terman Group Test of Mental Ability) and if he worked with a reasonable degree of thoroughness and concentration. Blakely (3), however, found that high-school pupils having I.Q.'s (Terman Group Test) of less than 100 had one chance in two of failure in French. If students of less ability had to take foreign language because of college entrance requirements, they were advised to postpone it until the last part of their high-school course. Whether or not these students were thus saved from failure is not reported.

For those who advocate introducing foreign language in the elementary grades, studies made upon high-school students (such as Blakely's and Jordan's) give no crucial information because the mental ages of high-school students represent so great a difference in mental equipment even if the I.Q.'s are the same as those of the elementary-school pupils. A better technique was used by Kaulfers (15), but he applied it only to high-school students. He sought to determine the mental age necessary to make certain scores on a Spanish vocabulary test and on a Spanish silent-reading test. He found that a mental age of more than 15 years was necessary to give a vocabulary score of 20 to 29 points, and a mental age of more than 16 years, for a score of 50 to 59 points; and this was essentially true for groups who had studied Spanish for periods of time varying from one to eight semesters. To score 6 to 8 points on the silent-reading test required a mental age of more than 15 years; to score 15 to 17 points, a mental age of approximately 17 years. Boys seemed to require a higher mental age than girls to make similar scores, either on account of less interest or less ability in the foreign language with attendant inferior habits of study and application. In other studies (16, 17, 18) he found an I.Q. of 109 for boys and 107 for girls a prerequisite for satisfactory junior- and senior-high-school work in Spanish.

3. The Relation between Achievement in Foreign Language and Scores on Prognostic and Readiness Tests

Studies by Blakely (3), Jordan (14), and others indicate that a high-school student who makes a score of less than 300 on the Wilkins Prognosis Test has about an even chance of success (Jordan), and that if his score is below 240 he has one chance in four of success (Blakely); in both cases 'success' is measured by teachers' marks, which are presumed to measure satisfactorily the extent to which the objectives of foreign language instruction have been attained.

More recent studies, however, give somewhat more precise predictions. The Symonds (20 and 25) Foreign Language Prognosis Test yields correlations from around .50 to .70 with objective achievement examinations and teacher's marks. However, Symonds (25, p. 551; see also 22) believes the test has a value greater than indicated by the correlations.¹

VI. THE RESEARCH NEEDED TO GIVE MORE CONCLUSIVE EVIDENCE ON THE TIME AT WHICH TO INITIATE FOREIGN LANGUAGE STUDY

To determine the best chronological or mental age at which to initiate the study of foreign language is a very complex problem. Its difficulty is greatly increased by the "varying aims or objectives, growth and intellectual maturity, individual differences in needs and capacities, and the relative value of modern (or ancient) languages in comparison with other subjects which they would replace or by which they would be replaced" (13, p. 322). Not only must varying methods, materials, and qualities of teaching be taken into account for each of the five or more objectives of foreign language study at varying mental and chronological ages, but also the relative permanence of early versus late beginning of study must be determined before a conclusive answer can be given.

Specific studies, attacking the various phases of this problem, should be set up. For example, in reference to developing and retaining a better ability to read for thought (a) when taught by an intensive study of a small amount of reading material, do individuals who are younger chronologically or mentally surpass those who are older, or vice versa? Or (b) when taught by the direct use of more extensive reading materials, which group excels? And similarly in detail for the other objectives and other materials and methods.

VII. SUMMARY

1. Chronological age and mental age are two important factors in determining achievement in a foreign language. Other important factors are varying objectives, materials, methods, and qualities of teaching.
2. Many objectives of foreign language study have been advocated

¹ The literature on the problems of bilingualism is very extensive, but conclusive evidence is lacking on the best time to initiate foreign language study in the case of bilinguals. For a recent study on bilingualism see Arsenian (1); for an earlier study see the report of Michael West (27). Arsenian gives an excellent bibliography of 171 titles through 1935.

at various times. In this chapter attention is given to the five objectives set up in the important *Coleman Report*.

3. The experimental data on the optimal time to initiate foreign language study are meager or inconclusive.

4. Taking the experimental evidence at face value, the tentative conclusion is drawn that the study of foreign language to develop ability to read for thought probably should be begun sometime after the seventh grade; that is, after age twelve. Some of the best evidence now available, however, indicates that even better results may be obtained if the study is begun at the eleventh grade or thereafter (age seventeen or adult ages), although differences in motivation may account for part of the differences in results.

5. Other evidence relating to attempts to realize more than one of these objectives seems to indicate a slight advantage in delaying initial foreign language study until the later high-school years. Here, again, the evidence is far from conclusive.

6. No conclusive data have been found that would determine the best age at which to begin learning to *speak* a foreign language.

7. Some data have been presented showing the relation of achievement in foreign language to scores on prognostic and readiness tests.

8. Further careful research on a great number of highly complex problems is needed before conclusive answers can be given to the question: "When should foreign language study be initiated?"

9. An urgent need to reconsider carefully the place of foreign language in American education is evident. It is particularly important to compare, for American students, the relative values of foreign language study and the subjects that might replace it.

BIBLIOGRAPHY

- (1) ARSENIAN, S. *Bilingualism and Mental Development*. (New York: Teachers College, Columbia University, 1937. 164 pp.)
- (2) BAGSTER-COLLINS, E. W. "History of Modern Language Teaching in the United States," pp. 15-72 in *Studies in Modern Language Teaching*. (Vol. 17, Publications of the American and Canadian Committees in Modern Languages. New York. The Macmillan Company, 1930. 491 pp.)
- (3) BLAKELY, RUTH "The use of prognostic tests in modern language." *School Review*, 35: 1927, 692-698.
- (4) BUSWELL, G. T. *A Laboratory Study of the Reading of Modern Foreign Languages*. (Publications of the American and Canadian Committees on Modern Languages. New York: The Macmillan Company, 1927. 195 pp.)
- (5) CHEYDLEUR, F. D. "An experiment in adult learning of French at the Madison, Wisconsin, Vocational School." *Jour. of Educ. Research*, 26: 1932, 259-275.

- (6) COLE, ROBERT D. *Modern Foreign Languages and Their Teaching*. (New York. D Appleton-Century Company, 1937. 640 pp)
- (7) COLEMAN, ALGERNON *The Teaching of Modern Foreign Languages in the United States*. (New York The Macmillan Company, 1929. 299 pp) Known as "The Coleman Report"
- (8) EURICH, A. C. "The reliability and validity of photographs of eye-movement records" *Jour. of Educ. Psychol.*, 24: 1933, 118-122
- (9) FINCH, F. H., and FLOYD, O. R. "The relation of chronological age to achievement in the study of French." *Jour. of Educ. Psychol.*, 26: 1935, 52-58.
- (10) FRAZIER, M. M., and CRAWFORD, C. C. "A comparison of adults with junior-high-school students as to progress in learning Spanish." *Modern Language Forum*, 16 1931, 40-42.
- (11) FUTCH, O. "The reliability and validity of photographic eye-movement records in the reading of Latin." *Jour. of Educ. Psychol.*, 25: 1934, 620-629.
- (12) GRONOW, ANNA T. "German in the University Elementary School, Chicago, Ill." *Modern Language Jour.*, 3: 1918-19, 100-106.
- (13) HENMON, V. A. C. *Achievement Tests in the Modern Foreign Languages*. (New York: The Macmillan Company, 1929. 363 pp)
- (14) JORDAN, J. N. "Prognosis in foreign language in secondary schools." *School Review*, 33: 1925, 541-546.
- (15) KAULFERS, W. V. "Effect of mental age on foreign language achievement" *Jour. of Applied Psychol.*, 14: 1930, 257-268.
- (16) KAULFERS, W. V. "Effect of I.Q. on grades of 1000 students of foreign languages." *School and Society*, 30: 1929, 163-164.
- (17) KAULFERS, W. V. "Intelligence factor in foreign language achievement." *School Review*, 39: 1931, 42-48.
- (18) KAULFERS, W. V. "Prognostic value of the I.Q. in Spanish." *Modern Language Forum*, 14 1929, 5-9.
- (19) LI, CHEN-NAN. "Factors Conditioning Achievement in Modern Foreign Languages." (Unpublished doctorate dissertation, Yale University, 1927.)
- (20) Orleans-Solomon Latin Prognosis Test Manual of Directions. (Yonkers: World Book Company)
- (21) Report of the Committee of Twelve of the Modern Language Association of America. (Boston: D. C. Heath and Company, 1901)
- (22) RICHARDSON, H. D. "Discovering aptitude for the modern languages." *Modern Language Jour.*, 18 1933, 160-170.
- (23) SCHMIDT, LYDIA M. "The Course in German in the University of Chicago High School, Chicago, Ill." *Modern Language Jour.*, 3: 1918-19, 107-116.
- (24) SPINK, JOSETTE E. "French in the elementary school." *Elem. School Jour.*, 31 1930-31, 684-696.
- (25) SYMONDS, P. M. "A foreign language prognosis test." *Teachers College Record*, 31: 1929-30, 540-556.
- (26) THORNDIKE, E. L. *Adult Learning*. (New York: The Macmillan Company, 1928. 335 pp.)
- (27) WHEELER, C. A. "Enrollment in the Foreign Languages in Secondary Schools and Colleges of the United States." Vol. 4, *Modern Language Report*. (New York: The Macmillan Company, 1930. 451 pp.)

CHAPTER XV

THE DEVELOPMENT OF ABILITY IN ARITHMETIC

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I. THE SOCIAL SIGNIFICANCE OF ARITHMETIC

In the modern curriculum, arithmetic has much broader functions than were commonly recognized in the traditional school. Present thinking emphasizes four major functions of arithmetic: (a) the computational function, which deals with the development of essential computational skills; (b) the informational function, which deals with the development of an understanding of the history, evolution, and present status of institutions, such as banks, insurance, and taxation, that have been created by society to deal with social uses of number; (c) the sociological function, which deals with the development of an awareness of the problems faced by these institutions and of the means, current and proposed, for solving those problems; and (d) the psychological function, which deals with the development of the power to do quantitative thinking and of an appreciation of the value and significance of quantitative data and methods in dealing with the affairs of life (16).

Computational arithmetic may be differentiated from social arithmetic. The latter may be regarded as including the informational, sociological, and psychological functions listed above. Computational arithmetic consists of a hierarchy of knowledge, skills, and abilities to be mastered. The logic of the number system has in the past to a large extent determined the order in which the computational skills have been taught, since it is true that each of the major skills requires the use of more basic skills that must be mastered before the more difficult processes can be learned. It is also commonly recognized that there are points below which it is not advisable to attempt to teach a particular process. For example, no one would think seriously of teaching long division in the second grade or calculus at the junior-high-school level. In recent years a number of investigations have attempted to determine with some precision the optimal points at which

to present each of the processes. These studies will be reviewed later in this section.

Social arithmetic does not consist of such a definite hierarchy of skills to be mastered, but rather includes a variety of abilities, insights, generalizations, and ideas that in a sense develop and change throughout the life of the individual. These ideas are encountered in the affairs of daily life and have meaning to the extent that they are directly related to the common experiences of people. The growth of the quantitative elements of the vocabulary is a gradual process, beginning at a very early age and continuing at varying rates throughout life. The meaning a particular word may have is the by-product of experience. Similarly, appreciation of the social significance of money, measurement, business practices, taxes, and geometric design is the outcome of a more or less continuous process of growth and development to which all experience contributes and that can at all times be facilitated by well-planned instruction. Of course it is true that different individuals at any given level of schooling will not have the same breadth of appreciation and understanding of such topics as those listed. However, it is evident that for each individual these values will become richer, broader, and more vital as he proceeds through successive stages of a well-planned curriculum that emphasizes the social functions of arithmetic, and that these concepts will take on added meaning and significance throughout life.

II. PROCEDURES IN COMPUTATIONAL AND IN SOCIAL ARITHMETIC

It thus appears that arithmetic instruction must recognize two different kinds of outcomes, each of which requires an essentially different kind of teaching procedure to insure its achievement. Computational arithmetic requires the use of systematic, carefully graded learning materials that will insure easy effective learning of number processes. In these materials the steps in learning will be from easy processes to more difficult ones, with systematic diagnostic testing at all points to locate difficulties. Research has conclusively demonstrated that no new process should be taught until the pupil is 'ready' for it; that is, until he has the mental ability to learn the process, until the essential basic skills are established, and until the process has meaning for him as the result of experiences that show him its social value.

In so far as social arithmetic is concerned, the chief instructional problem is to utilize a rich, well-planned series of social experiences that will give the learner many-sided contacts with the important appli-

cations and uses of number in the affairs of daily life. As far as we now know, there is no particular sequence in which these units of instruction need appear. The order of their appearance can vary from class to class as the occasion may warrant. Nor need these activities be the same in all classes. In these experiences the need of computational arithmetic will be clearly demonstrated. Many maintain that drill on number processes should be assigned only after pupils have sensed their need of these processes to carry on their activities. The outcomes of these rich social units will be valuable knowledge, insight, appreciation, and ability, to which the work at successive levels will add its contribution.

In so far as the curriculum related to social arithmetic is concerned, it is regarded as necessary that the teacher select social units adapted to the level of development, interests, and needs of the pupils in the group that will at the same time apply concretely the computational processes most readily learned at that level. As will be shown later in this chapter, a number of investigators have made studies of the kinds of units suitable for various levels of the school. However, these are not as definite in suggestions as to sequential arrangement of materials as are the studies of computational arithmetic. This lack of specificity is largely due to the fact that the outcomes of social arithmetic are of a cumulative developmental kind, constantly being enriched and altered as the result of social experiences, whereas skill in a computational process may in fact be mastered at one level of the school and be used substantially as originally learned at higher levels — save that rate of work in the particular skill will increase as the pupil progresses through the school.

It should be pointed out that there is some evidence to indicate that there is not so much need of systematic, logically organized instruction in computational processes as has sometimes been thought necessary. Harap (22, 23), for example, has shown that processes in whole numbers, fractions, and decimals can be learned through their practical use in carefully selected activities adapted to the level of development and interests of the pupils, in which the need of performing computations involving these processes arises. No further organized practice or supplementary drill appears to be necessary, he reports. These findings are extremely important for those who wish to utilize the 'activity' approach in instruction. They demonstrate the desirability of presenting number processes in connection with meaningful experiences, even though it is planned to carry on sub-

sequently a program of systematic practice with prepared materials (14). Harap unfortunately did not determine the optimal level at which these skills could be taught through activities such as were used in his experiments; indeed, he taught them in only one grade in each case. No data are available in his studies as to the relative ease of learning these processes at other grade levels under the same conditions or under variations of these conditions.

III. INDIVIDUAL DIFFERENCES IN ARITHMETIC

The fact of individual differences is of great significance, both in the organization of the curriculum and in the selection of methods of instruction. Investigations have made it clear that the curriculum should be kept flexible because of differences in the rates at which children learn. These differences have been revealed by many studies (13). Failure to recognize them has been one of the major factors contributing to the difficulty such large numbers of children have had with arithmetic. To provide for these differences in the rate of learning number processes, materials have been devised that make it possible for pupils to progress at different rates in the mastery of computational skills. Such drill materials as those devised by Courtis, Studebaker, Washburne, and others illustrate the point. Several workbooks are available that provide effectively for adapting instruction in computational arithmetic to individual differences in rates of learning. There is no longer any reason why all pupils in a group should be at work on the same computational skill at the same time, regardless of the differences existing in their readiness for this work. The curriculum should not be organized as a set body of materials for each grade that all pupils are required to master before promotion to the next grade. Ideally instruction in computation should be adapted to the level of progress of each learner and to his rate of learning.

Individual differences in learning social arithmetic are probably as great as in computational arithmetic, but the method of dealing with them is not the same. The fact that probably no two persons learn the same things from any social experience in which both may participate should be recognized. Instead, therefore, of providing a systematic series of excercises in social arithmetic with certain definite outcomes so organized that pupils may progress at different rates, as can be done in computational arithmetic, the teacher should provide a variety of rich group experiences that introduce aspects of social arithmetic to the class and enable the pupils to explore their different

interests and to relate what is being learned to their varied backgrounds of experiences. Applications of number in all school subjects furnish many opportunities for this kind of activity. The outcomes of these formal and incidental experiences will vary widely among the members of the group.

The method of organizing instruction dealing with social arithmetic therefore differs considerably from that of organizing instruction in the computational aspects of the subject. The former may be organized as a class or group activity, the latter should be individualized. However, in both instances the teacher should be concerned with the selection of those procedures and experiences that will facilitate learning and that are adapted to the level of development of the individual. Both phases of arithmetic must be definitely provided for, since investigations have shown that under present conditions there is a low correlation between the scores on tests of social and computational arithmetic (17). The problems involved that are related to the issue of this Yearbook may be stated as follows:

In relation to computational arithmetic:

1. What is the optimal sequence of steps in presenting the number facts and processes?
2. Are there points in the child's development before which it is not advisable to teach the various number processes if efficient learning is to take place?
3. In what ways can instruction provide adequately for individual differences in rates of learning number processes?

In relation to social arithmetic:

1. What types of quantitative social concepts should be presented at various stages in the curriculum?
2. Are there definite stages in the child's development at which they can be most suitably introduced?
3. What are the most satisfactory means of developing meaningful social concepts in the field of arithmetic?
4. How can units of social arithmetic be selected so as to contribute effectively at the same time to the vitalizing of instruction in computational arithmetic?

IV. DEVELOPMENTAL LEVELS IN ARITHMETIC

So far as can be discovered, no one has published a definition of developmental levels in either computational or social arithmetic that is based on extensive studies of the growth process, such as are available for language, reading, and physical development. For purposes

of discussion the following developmental levels, the bases of which will be elaborated in this chapter, may be distinguished:

Stage 1

The stage at which readiness for formal number work is attained. During this period the child acquires a considerable variety of simple quantitative concepts and a small quantitative vocabulary through incidental contact with number in his daily informal experiences, and through guided experiences and training in school that promote number readiness. This level comprises the preschool years, the kindergarten, and usually at least part of Grade I.

Stage 2

The initial stage in learning arithmetic. This usually comprises Grades I and II, during which the child acquires the ability to read numbers, to count systematically, and to group and compare objects. He also learns easily the basic number facts of addition and subtraction, either through organized teaching or through informal procedures. Through well-chosen social activities involving simple applications of number in measurements and social practices, the pupil can readily be led to acquire a rich background of meaning, which will facilitate more formal learning at the next stage. There is a rapid increase in his arithmetical vocabulary. Usually there is considerable interest in number work.

Stage 3

The stage of rapid progress in fundamental arithmetic habits and attitudes. This stage includes in general Grades III and IV, during which the pupil masters the simpler processes with whole numbers readily, his knowledge and understanding of social arithmetic is expanded, and he develops the ability to apply simple quantitative methods in his affairs. At the end of this stage the pupils should have mastered the addition and subtraction facts, the easier multiplication and division facts, and the simpler computational processes involving whole numbers. He should also have an understanding of the meaning and uses of the more common fractions.

Stage 4

The stage during which social experience extends rapidly and increased power, efficiency, and skill in arithmetic computation are developed. This stage includes Grades V to VIII, during which occurs the learning of generalized number concepts, more difficult processes in fractions of various kinds, long division, and more difficult social applications of number, and during which there is rapid growth in power to think quantitatively.

Stage 5

The stage at which special aptitudes appear and broader interests are developed. This stage is at the high-school and college level, at which point spe-

cial aptitudes are recognized, interests are developed and broadened, and a high level of efficiency in the uses of number is secured.

It should be recognized that these stages of development cannot be sharply differentiated and that they merge gradually as parts of a continuous process of growth. While approximate grade limits are given for each stage, these designations should serve merely as guides to teachers, since pupils will not all reach the various stages at the same time.

V. INVESTIGATIONS DEALING WITH ARITHMETIC DEVELOPMENT

1. The Main Topics of Investigation

The results of systematic studies of the characteristics of children at each of these five stages of development help us to understand the instructional problems at the various levels of the school. It may be useful at this point to classify briefly the kinds of studies that have been made at various stages before discussing the methods used and the resulting findings.

In general the studies may be grouped under the following eight heads:

1. Vocabulary development
2. Counting — serial, grouping, comparing
3. Knowledge of combinations and their difficulty
4. The number processes, their difficulty, and gradation
5. Uses of number by children and adults in school and in life outside the school
6. Errors, social needs, and difficulties
7. Reading difficulties of graphic and tabular materials of various kinds
8. Development of units in social arithmetic

It will be observed that these eight main topics deal with various aspects of the four functions that have been presented earlier in this chapter. However, it is clear that most of the studies relate to some phase of the computational function, such as the ability of the pupils to count, the knowledge children have of number facts, the relative difficulty of number combinations, and the difficulty and gradation of number processes.

The most significant studies of gradation of arithmetic processes and topics now available are those of the Committee of Seven, which attempted to determine the optimal stage in child development at

which various processes and topics should be presented. Because of the importance of these studies, they will be discussed in some detail in the next chapter. The recent increased interest in the other functions of arithmetic is revealed by the growing number of studies of vocabulary and concept development and of the learning that takes place in social activities involving the use of number in various ways.

2. The Methods Used in the Investigations

Numerous minor differences exist among the many methods that have been used to study arithmetical development. However, the general procedures may be grouped under the five heads: (a) observation, incidental or systematic, (b) questionnaire or interview, (c) testing and direct measurement, (d) experimentation, and (e) clinical or laboratory procedures.

a. Observation. Here may be grouped those procedures that involve the direct or indirect observation of the individual to discover the ways in which he uses numbers in his activities, the vocabulary he employs or encounters, his skill in the manipulation of instruments of precision, his methods of work, and similar items concerning which information can be secured by observing the behavior of the individual. This observation has been done wholly incidentally in some cases; in other cases it has been systematically conducted. Statistical analysis of the arithmetic vocabulary the pupil finds in the books he reads is an illustration of indirect systematic observation, as contrasted with direct observation.

b. Questionnaire or Interview. This approach involves the use of suitable means of securing information from the individual rather than through the observation of his activities. Information has been secured in this way about the child's uses of number, his difficulties, his interests in arithmetic, the topics he would like to study, and his methods of work.

c. Testing and Direct Measurement. Investigators who used this procedure administered tests that gave information about such items as the computational ability of pupils at any or all grade levels, the knowledge they have of units of measurement, their knowledge about social applications of number, the location of specific difficulties, and the development of vocabulary.

d. Experimentation. By experimentation we mean the systematic study of some problem under known conditions. This procedure has been applied in a number of important studies of arithmetical develop-

ment; for example, the determination of the mental level required to master the various number processes, the study of the amount of arithmetic learned in activity units, and the learning difficulty of number combinations.

e. Clinical or Laboratory Approach. In this group may be placed the procedures that require the use of the systematic, precise methods commonly employed in the laboratory. Illustrative studies of this sort are the analysis of errors and methods of work, the nature of eye-movements in reading numbers or working examples, and studies of problem cases.

3. The Results Obtained

The findings of these studies have thrown a great deal of light on the nature of development in arithmetic. This information should be utilized in the planning of the curriculum and in the organization of instructional materials. The general findings of these studies are grouped in what follows under the eight headings listed as the main topics investigated. Brief summaries of the major findings in each group and statements of their bearing on the issue with which the Yearbook deals are included. References to illustrative studies are given, which the reader should consult for detailed information.

a. Vocabulary Development. The studies of vocabulary development are discussed in detail in the chapter on language. They show the rate at which the arithmetical vocabulary develops, the range of vocabulary, and the kinds of words used by children at various levels, information that is helpful in placement of words in books, courses of study, and so forth (17, 34, 42). These studies will not be reviewed at this point. The difficulty studies, based largely on tests of the pupil's understanding of vocabulary, are discussed more fully under (f), the studies of reading in arithmetic. They provide an index of the extent to which given words and concepts are now known by children at various mental-age levels. Several standard tests of the growth of arithmetical vocabulary are available (7). Buswell has shown that in general there is a growth in the understanding by children of important basic words in the arithmetical vocabulary, such as *average*, *estimate*, and *century*, from grade to grade, but at a slow rate (12). He demonstrated the fact that in the case of some words; for example, *acre*, *perimeter*, and *rectangle*, there is little growth of understanding in the grades in which he tested. He also showed that there were wide variations in the scores of pupils from school to school, indicating differences in

the emphasis placed on vocabulary development. Grossnickle (17) has demonstrated the very low level of understanding that pupils in Grades VII and VIII have of many of the concepts of social arithmetic taught in these grades. The relative difficulty of various groups of items included in Grossnickle's test was as follows: 1. Taxation (71.9% mastery) ; 2. Stocks and bonds (68.2% mastery) ; 3. Banking (63.4% mastery) ; 4. Insurance (56.6% mastery) ; and 5. Merchandising (47.9% mastery). While these indexes give some indication of what the difficulty of these items is under present conditions, further study of this point under possibly more effective instructional programs is necessary. This comment also applies to Buswell's data. There is practically no experimental evidence available as to the optimal mental or developmental level at which to teach any given arithmetical vocabulary. As will be shown later, a few studies have been made by the Committee of Seven to determine, if possible, the best points at which to teach certain quantitative concepts and information related to measurement.

It seems clear from all the evidence that the schools have not succeeded in teaching effectively many important elements of the arithmetical vocabulary. Steps should be taken to further the development at all levels of a better understanding of many of the socially valuable quantitative concepts now included in the curriculum. The present unsatisfactory condition relative to vocabulary development is undoubtedly due largely to the overemphasis there has been in the past on computational arithmetic. Steel (39), for example, showed that over 85 percent of the time devoted to arithmetic in a large number of schools in Minnesota was devoted to drill on arithmetical processes, whereas less than one percent was devoted to vocabulary development.

b. Counting. Studies of counting deal largely with the development of the ability of pupils to count abstractly or concretely in various ways. These studies show that there is a gradual development of this ability, beginning in some cases at the very early age of approximately two years, and increasing rapidly in most cases at the ages of four to six (27, 31). At the time of entrance into school there are extremely wide variations in the ability of pupils to count (5, 10). Some count very efficiently in a variety of ways; others possess little, if any, ability to count (51). This suggests that at this level it is highly desirable to give the pupils who lack the ability to count a variety of concrete experiences in which counting is used as an integral part of the activity. It has been found that there is a rapid increase in the

ability to count in the primary grades under such conditions. By Grade IV most pupils can count very effectively (24).

In a sense, the counting and the vocabulary studies deal with related concepts, the former largely from the point of view of the ability of the pupil to apply meaningfully and functionally the serial relationships in the number system, the latter with the actual presence of the names of numbers in his vocabulary.

Some of our mental tests — the Binet test and its several revisions, for example — include certain items about counting and other uses of number (41). Thus, ability to repeat orally three digits is a test for mental age three, five digits for mental age seven, and six digits for mental age ten. Another test for mental age six consists of ability to count objects. These items afford an index of the relation between ability to use numbers and mental development.

No studies have been found that deal with the question of the optimal mental level at which to teach various forms of counting. Studies of counting deal primarily with the present status of ability to count as determined by test and observation.

c. Number Combinations and Their Difficulty. Tests have shown that a considerable proportion of children possess a working knowledge of at least the easy number combinations in addition and subtraction at the time they enter the first grade (10, 51). These combinations apparently have been learned by children as a result of incidental contacts with numbers in their daily activities outside the school. It is equally true that another considerable number of children have practically no knowledge of addition or subtraction combinations at that time. In general, most of the children possess then little or no knowledge of multiplication and division combinations.

Tests at succeeding grade levels reveal a very rapid increase in knowledge of combinations in addition and subtraction in Grades I to III even when there is no formal instruction in number (10, 48). By the end of Grade III these two sets of combinations are practically mastered, since errors are largely accidental and not persistent after that grade. Studies of pupils' knowledge of multiplication and division combinations from Grades III to VIII show a rapid increase in both rate and accuracy of work in Grades III to V when these combinations are systematically taught. Most pupils master these combinations by the end of Grade V. There is a slight, but gradual, improvement in accuracy after Grade V that continues until Grade VIII and beyond (15, 36). There is a gradual increase in the rate of writing answers to

all combinations that is directly related to the effects of physical maturation, since rate of writing increases as the children progress through the school.

A number of studies have dealt with the relative difficulty of number combinations in the several processes. In every case wide variations in the difficulty of the various combinations have been discovered. Considerable disagreement appears among the results of these studies; for example, the findings of the studies by Clapp (15) and Knight-Behrens (28) do not agree on the relative difficulty of the various addition and subtraction combinations. The differences are probably due to differences in the ways in which the two studies were conducted. In the former the difficulty of the combinations was determined by tests administered to pupils in Grades III to VIII who had already been taught the combinations, without any consideration of methods or materials of instruction. In the Knight-Behrens study an effort was made to determine the actual difficulty of the various combinations based on the results of records of actual pupil study in the primary grades. Although the number of cases involved in this study and in other studies of the difficulty of number combinations is rather small, it is obvious that this approach is much sounder than that used by Clapp. Washburne and Vogel (47), by giving the number combinations in different orders in repeated tests and by checking their results against Clapp's, found that, regardless of method of teaching and regardless of method of testing, certain combinations were inherently difficult; for example, $7 + 9$, $5 + 9$, $9 + 8$, $16 - 9$, $13 - 8$, $11 - 3$, $14 - 6$; 8×7 , 9×6 , 7×8 , and the zero combinations; and $54 \div 9$, and division combinations with the quotient of 1. They found, however, that these inherent difficulties disappear in the case of addition above Grade III but tend to persist in the other three processes, especially in multiplication, where the correlation between the number of errors made in Grade V and Grade VIII was .91.

An analysis of the results of these studies shows that the difficulty of the number combinations varies from pupil to pupil and that individual combinations in some cases present unusual difficulties for particular pupils. It is therefore evident that the teaching of the basic number facts should be so organized that each pupil may study those facts that present difficulty for him. This may be done through a plan involving pretests, individual drill materials, diagnosis when necessary, and varying the amount of practice according to individual needs. When organizing practice the teacher should give special con-

sideration to the findings relative to the apparent difficulty of each of the combinations as indicated in the available studies. For example, there appears to be a relation between the difficulty of a combination and the size of the numbers. Hence, the combinations with the smaller numbers should be taught first (28, 32).

The Committee of Seven (44, 45, 46) has conducted extensive studies of the optimal mental ages at which to teach the number combinations in the several basic processes. In its work the Committee dealt with the problem of learning under what may be regarded as formal procedures in which systematic drill played an important part. It was found that children in Grades I and II can readily master the basic addition and subtraction combinations under formal instruction.¹

There have also been studies by others of the learning of number combinations under more informal conditions, as in connection with activity units, that have indicated clearly that, under such conditions of direct use, number combinations are readily learned in the primary grades without formally organized practice work (4, 48).

The results of a group of studies bearing on the question of when to begin formal teaching of arithmetic should be considered at this point. MacGregor (29) found that Scottish children who began the work at the age of five learned arithmetic readily and scored much higher than American children at the age of eleven. Washburne (45) compared the achievements of a large group of sixth-grade children, some of whom began formal arithmetic in Grade I, others in Grade II, and others in Grade III. The advantage lay, in eleven of the twelve skills tested, with children who had begun the work in Grade I as compared with the other two groups, and with those who had begun arithmetic in Grade II as compared with those who had begun it in Grade III. Washburne reports, however, that in a study about to be published, as well as in some of the internal evidence in the earlier study just mentioned, there is clear evidence that when postponement of formal arithmetic is accompanied by rich informal experiences with numbers and quantities, there is a definite gain through postponement. In neither of these studies were outcomes other than computation evaluated. These and other studies clearly demonstrate that these young children in Grades I and II can be taught simple computational arithmetic with success.

Several experimental studies have been undertaken to determine the effect of postponing formal arithmetic for one or more years. Included in this group are control experimental studies by Ballard (1) in England

¹ More detail on this matter is presented in the following chapter.

in 1912, by Taylor (40) in 1916, and by Wilson (48) in 1930. In these studies one group was taught no formal arithmetic, while another group was taught the subject as usual. Benezet (3) also reported the results of postponing arithmetic. In each case the findings of the studies led the experimenters to recommend the postponement of formal arithmetic—Ballard until age seven, Taylor for one year, Wilson for two years, and Benezet for even longer. It should be pointed out, however, that in at least two of these studies, those of Wilson and Benezet, the program of instruction used with the experimental groups merely delayed *formal drill* work on number combinations and processes but did a great deal to develop meanings of number and skill in using number in informal ways in social situations. In other words there was in fact instruction in arithmetic in the first and second grades, only it was a type of instruction that stressed social, rather than computational, arithmetic.

Strong evidence, therefore, leads one to conclude that formal work on number processes can be delayed until at least the second, even the third grade, but that, if that is to be done, steps should be taken to develop in the first one or two grades a series of well-organized activities and units in social applications of number through which the child will be brought into contact with number in meaningful social situations in such a way as to insure more adequate readiness for the more formal work to follow. These studies do not justify the practice that has been adopted in some systems of eliminating arithmetical instruction in Grades I and II, as some have mistakenly supposed. They indicate rather that a different kind of program from the conventional one should be developed at this level, one that emphasizes number meaning and the consideration of the social uses of number in the daily affairs of children.

d. The Difficulty and Gradation of the Number Processes. The nature of the growth curve in general arithmetical ability has been revealed by various kinds of tests. Rate tests of number processes show that in general there is a gradual increase in the rate of work in each process from grade to grade, a fact that is apparently directly related to maturation (13, 27). They also show that there is a rapid initial increase in accuracy of work with number processes and a leveling off after about 90 percent of accuracy has been reached. Seldom does average accuracy on survey tests below Grade VIII exceed 95 percent under ordinary teaching conditions. Scaled tests show that general

mathematical ability increases steadily from grade to grade, for many persons through the college level, depending on the amount of special training in mathematics courses and the special aptitude of the pupils. The rate of growth is directly related to mental level, since growth curves of superior children are at a higher level than those for children of lesser ability, and the growth curves of children of inferior mental ability are lower than those for children of average or superior mental ability (20). There are very wide variations in the mathematical ability of individuals at all levels, indicating the need of adapting instruction to differences in rates of learning and levels of ability (33).

Numerous studies have been made of the relative difficulty of the various kinds of examples in each major process; for instance, in fractions (8). These studies have revealed a wide variation in the percentages of children at various grade and mental levels who are able to solve the different examples. The results of these investigations make it clear that in any process — in long division, for instance — there is a wide range in the difficulty of the various kinds of examples constituting the whole process. This suggests that we should probably not speak of the optimal mental level at which an entire process, such as long division, can best be taught. It may be better to consider the possibility of breaking a major process into elements, groups of which may be taught at different levels of development. It is also clear that pupils of inferior mental ability apparently cannot master some of the difficult processes as they are now taught in arithmetic and algebra, and that for them the curriculum must be greatly simplified (11).

The Committee of Seven attacked directly the problem of gradation of number processes in terms of the mental level at which they can be most effectively learned by children. Specific recommendations as to placement and order of presentation of all number processes have been made. In several instances the Committee recommended that more difficult elements of a process be taught at a higher level than the easier elements; in other cases, where it would have been desirable, there was no such differentiation. These specific recommendations are discussed in Chapter XVI.

A recent study by Grossnickle (18) raises some questions as to the finality of the findings of the Committee of Seven. He reported the results of a carefully organized and systematically supervised program of teaching long division to fourth-grade pupils that showed this process can be mastered by pupils of normal mental ability in this grade; that

is, at a level at least two years below that set by the Committee of Seven as the optional level for teaching long division.¹ Grossnickle points out that in his work the materials of instruction may have been more efficiently organized and the supervision more thorough than was possible under the conditions under which the Committee of Seven was obliged to operate. In any case it is evident that it will be desirable to check the recommendations of the Committee of Seven in detail by further studies, under improved conditions of teaching and with more effectively organized materials of instruction (26). Grossnickle gives no data as to difficulty of learning the various elements of the total process or as to the relative ease and effectiveness of learning this process at other grade levels under the conditions present in the classes with which he worked. It is quite possible that the difference in the effort required to learn this process at Grade V or VI might make it advisable to delay the teaching of the process until such grade, even though it can be taught to pupils in Grade IV. The time thus saved could be used for the study of social applications of arithmetic or in other profitable ways.

Another group of studies that has an important bearing on this issue is that dealing with the learning of number processes under less formal conditions than those used by either the Committee of Seven or Grossnickle. Harap (22, 23) has shown that number processes in whole numbers, fractions, and decimals are learned by pupils through their direct use in arithmetic 'activity' programs, with no formal practice, at least as well as under more formal procedures. The implication of Harap's findings is that the solution of the problem of the gradation of topics in social and computational arithmetic may not be merely to assume that the optimal point at which to teach a process to a pupil is when he has reached a certain mental level and possesses the requisite basic skills and background of experience. It may be a better plan to have all pupils learn number processes through direct use in carefully selected group experiences and activities, adapted to their level of development, this group work to be supplemented by well-organized exercises that make it possible to individualize practice on number processes. Further, it is evident that ease of learning is to a considerable extent affected by the conditions under which learning takes place. Learning a

¹ A large part of this apparent discrepancy, however, is accounted for by the fact, pointed out in the following chapter, that Grossnickle used mean achievement as a measure of success, whereas the Committee of Seven used lower quartile achievement for a criterion.—*Chairman.*

process may be much easier when the need of using it arises in some natural setting than when it is presented in a formal manner. It is also true that improved methods and materials of instruction may greatly reduce the difficulty of a topic.

e. Uses of Number in the Experiences of Children and Adults. This fifth group of studies yields no direct information on the relation between the grade-placement of a topic and the mental level required to master it. However, it yields a body of information concerning the uses of number in the activities of children, both in and out of school, that should be helpful in selecting units of the curriculum for various grade levels (35, 38, 42). If we assume that it is the task of the school to help pupils to do more effectively the desirable kinds of things they normally undertake both in and out of school, then it is important for the curriculum-maker to know how the pupils encounter number in their various activities and to help them both to understand the use and significance of the various applications and to perform the necessary operations with efficiency. Data as to the uses of number in adult life, including its social, vocational, and cultural aspects, as compared with standards set up by the school, are also valuable for the curriculum-maker. Studies have been made of the uses of number in the activities of individuals of a wide range of chronological ages—mainly, however, in the primary grades and at the adult level. These deal chiefly with the numbers and the computational processes used. The extent of the use of number in the affairs of young children is also revealed by the number of quantitative expressions found in their vocabularies (12). As has been shown by Buckingham (10), Woody (51), and many others, many number concepts are learned by young children incidentally in the activities of daily life. The few studies that have been made of the actual uses of number by children of the primary grades in life outside the school show that counting and very simple number processes, such as easy one- and two-place addition and subtraction, are practically the only computational arithmetic used by pupils at this level (38). These findings suggest that one reason why young children have so much difficulty in mastering arithmetic is found in their lack of contact with it in their everyday activities. There are no adequate comprehensive analyses of the kinds of number uses in the affairs of children in the middle and upper grades that afford a dependable basis for selecting suitable activities and units of work at the various levels of the school.

Another approach to this problem has been the analysis of the num-

bers required by pupils in their work in the various subjects of the curriculum (17, 19, 50). In some of these areas there are many uses of number, mostly on the informational or usage level; for example, in reading, science, and the social studies. In every subject there are numerous quantitative concepts that must be understood if the material being studied is to have meaning, even though actual computations are rarely performed or required in this work. It has also been shown that the pupils may encounter very few number applications in a typical activity curriculum in which the units are not so selected that arithmetic will presumably be needed to carry them out successfully (21). Hanna points out that units may be selected that will require the use of number and of social arithmetic in numerous ways, and that they need not unduly stress computational arithmetic. Increasingly it is being realized that one of the important functions of instruction in arithmetic is to develop skill in the use of the tools of learning, such as skill in the interpretation of tabular, statistical, and graphic materials, and an understanding of the quantitative concepts and principles essential to effective learning and study in all areas of the curriculum.

f. Errors, Needs, and Difficulties. This sixth group of studies presents information as to the nature of the errors made in the various number processes by children at various stages of growth and the kinds of difficulties they encounter. These studies show that in the initial stages there is in most cases considerable trial-and-error learning (6). This form of behavior is especially pronounced when the basic meanings and facts have not first been carefully developed. Another factor contributing to this type of difficulty is poor, unorganized first-teaching. Well-planned presentation and development of a process will eliminate much of this trial-and-error type of learning.

An analysis of the oral responses of pupils and of their written work reveals the fact that most of those who are not making satisfactory progress—also in some cases those whose achievements in tests are apparently up to standard—employ peculiar, roundabout, inefficient procedures in solving examples and problems and that these bad procedures seriously interfere with desirable growth (8, 13). These faulty methods of work are found at all levels of the school (11), though most commonly in the work of children in Grades III to VI. There appears to be a decrease from grade to grade in the number of children whose performance includes these faults (13), and the number can be reduced considerably further by more careful instruction at the lower levels and by the systematic use at all levels of the diagnostic tests and

procedures now available. Obviously the improvement of instructional materials and the wise, careful adaptation of the pace of progress to the differences in the rates of learning among the pupils will also greatly improve this situation. Premature practice on number processes before the basic skills and understandings have been established, failure to teach pupils efficient methods of work, and failure to analyze the methods they employ are potent factors contributing to the acquisition by the pupils of faulty methods of work (6).

It is a notorious fact that arithmetic has contributed more to non-promotion of pupils in grades above the first than any other subject of the curriculum. The problem of non-promotion at the high-school and college levels in courses in arithmetic and mathematics is even more serious because of the human wastage resulting from the consequent elimination of students at this stage. It seems clear that many pupils are not able to master the higher branches of mathematics. The plan of using various means of prognosticating future success in mathematics should lead to more effective guidance of pupils into courses adapted to their potential abilities (24). The present tendency to shift formal algebra to Grade X, as has been done by many schools in Wisconsin, Minnesota, and other states, is a recognition of the fact that for most pupils an added year of maturity, plus further extension of experience in the use of numbers, may increase the likelihood of successful work in the subject. This conclusion has not been established experimentally. In many schools pupils likely not to succeed in the various branches of mathematics are guided away from them into more appropriate courses.

*g. Reading Difficulty of Tabular and Graphic Materials.*¹ An excellent study by Matthews (30) shows the relative difficulty of interpreting various forms of graphic and tabular materials for pupils in Grades IV to XII. For each form of material that he investigated there is a gradual decrease in difficulty from grade to grade. Some forms (for example, circle graphs) appeared to be much easier for children to read than others, such as bar and line graphs. The order of difficulty for all grades was the same; namely, (1) circle graphs, (2) simple bar graphs, and (3) line graphs. This information is not directly related by Matthews to mental age, but makes it apparent that the growth of ability to read these materials under present methods of instruction is a gradual process. Practice on interpreting various kinds of charts, tables, and graphs can begin as low as Grades III or IV. No data are given by

¹ This aspect of arithmetic is also treated, and much more fully, in Chapter XVII. — *Chairman.*

Matthews as to the ease of interpretation by pupils at several levels of the schools under various forms of instruction.

h. Development of Social Units in Arithmetic. In several centers studies have been conducted dealing with what we may call the 'appropriateness' of various social units for the different grade levels. The common practice used is to select a topic that is thought to be satisfactory, select and develop the necessary teaching materials, teach the unit, record the activities, and measure the outcomes. Then the unit is evaluated, revised as may seem advisable, tried again, and ultimately assigned to a particular grade or group of grades. Barnes (2) developed an excellent second-grade unit on the post office; Schaefer (37) a unit for Grade III on telling time; Harap (22) a series of units for Grade VI on consumer's arithmetic. In all this work consideration was given to available data about the pupils, their interests, their reading ability, the difficulty of the concepts and processes involved, the availability of reading materials adapted to the grade level, and other facts related to development that may be helpful in organizing the instructional program (14, 25).

The chief point growing out of these studies is that it is possible to modify at will the content of almost any social topic and so to adapt the treatment that it appears to be satisfactory for various grade levels. Obviously the treatment will be simpler in the lower grades than in the upper. Since these units often involve relatively little computation, the difficulty of the computations presents no problem. Gradation of a social arithmetic topic is thus determined not by the inherent difficulty of the topic or the computations involved, but by the way in which it is treated and its appeal to the children. This plan of developing social units for various levels of the school should be greatly extended. Ultimately there should be available a much wider variety of social units of demonstrated value than can be found at present—so numerous, indeed, that every teacher will be able to select from among them only those units best adapted to the interests and level of development of the pupils. Provision could be made in the construction of units for each level of the school to introduce the processes most suitably presented at that level. This field is one greatly in need of further exploration.

VI. CONCLUSIONS

First, the arithmetic curriculum should place much greater emphasis on social arithmetic than has been the practice in the past. The acceptance of this position should result in a radical change in the char-

acter of the arithmetic work in the primary grades, a recognition of stages one and two in the development of arithmetic. Here it is essential that stress be placed on the development of number meanings and an appreciation of the functional uses of number in the affairs of children. This readiness program should have as its major purpose the development of readiness on the part of pupils for the more formal number work to be begun at the third stage of instruction.

Second, the core of the curriculum should consist of a series of carefully selected units of social arithmetic of demonstrated value adapted to the needs, interests, and level of progress of the pupils. The purpose of these units should be to give the pupils a rich social insight and an understanding of the functions of number in daily life and to enable them to participate more effectively in the affairs of a changing industrial democratic society. The units should vary from locality to locality, but the basic principles underlying their selection should be the same in all places. Emphasis is placed by the Yearbook Committee on the planned approach to be made to this work, since it is held that an unplanned, incidental approach to the subject will not produce the desired results. Much experimental work must be done before we can be sure that the elements of a planned program of arithmetic that gives due consideration to child development are validly established.

Third, through these units of work the pupil should also be led to see the functional value of the various number processes and be given ample opportunity to apply them in a meaningful way. It is essential that the work in social and computational arithmetic be carefully integrated. This can be accomplished by selecting units of work for the different grade levels that will give the best opportunity to present the number processes most suitably taught at each level. The information concerning the learning difficulty of the several number processes produced by such investigations as those of the Committee of Seven, as outlined in Chapter XVI, should be of great value in determining the proper arrangement and gradation of the number processes. Further study is needed of the relation between the apparent learning difficulty of the elements of the different number processes and the nature of methods and materials of instruction. Data that are now available on these points are based on results secured under existing conditions. It is obvious that somewhat different results may be secured under improved methods of teaching, with improved materials of instruction, or when a different approach to the teaching of number is used; for example, through a socialized approach.

Fourth, whatever the plan may be that is finally selected for organizing the curriculum, careful consideration must be given to the question of individual differences. Pupils do not all learn at the same rate, nor do they learn the same body of information from any single experience. It is clear, therefore, that it is desirable to provide a plan of practice on the number processes that will enable each pupil to practice on materials adjusted to his level of development and rate of growth. It is desirable, likewise, that every effort be made to adapt the rate of progress of the class work to the ability of the pupil. To this end it is necessary that the teacher have information concerning the pupil's level of mental development, and reliable information as to his readiness to undertake the work on the new step or process, including not only his ability in basic skills essential to the process to be presented but also his understanding of the concepts that are involved.

BIBLIOGRAPHY

- (1) BALLARD, P. B. "The teaching of mathematics in London public elementary schools. The teaching of mathematics in the United Kingdom," Part I, pp. 3-20. *Board of Education Report on Educational Subjects*. Vol. XXVI. (London: His Majesty's Stationery Office, 1912)
- (2) BARNES, E., and YOUNG, B. *Children and Architecture*. (New York: Teachers College, Columbia University, 1932)
- (3) BENEZET, L. P. "The story of an experiment." *Jour. of the Nat. Education Assoc.*, 24: 241-244, 301-303; 25: 7-8.
- (4) BROWNELL, W. A. "Readiness and the arithmetic curriculum" *Elem. Sch. Jour.*, 38: 344-355.
- (5) BROWNELL, W. A. *The Development of Children's Number Ideas in the Primary Grades*. Supplementary Educational Monograph, No. 35 (Chicago: University of Chicago Press, 1928)
- (6) BROWNELL, W. A., and CHAZAL, CHARLOTTE. "The effect of premature drill on third-grade arithmetic." *Jour. of Educ. Research*, 29: 17-29
- (7) BRUECKNER, L. J. "Intercorrelations of arithmetical abilities." *Jour. of Experimental Educ.*, 3: 42-44.
- (8) BRUECKNER, L. J. *Diagnostic and Remedial Teaching in Arithmetic*. (Philadelphia: Winston Company, 1930)
- (9) BRUECKNER, L. J. "Social problems as a basis for a vitalized arithmetic curriculum." *Jour. of Experimental Educ.*, 1: 320-323.
- (10) BUCKINGHAM, B. R., and MACLATCHY, J. "The Number Abilities of Children When They Enter the First Grade." *Twenty-Ninth Yearbook of this Society*, 1930, 473-524.
- (11) BUCKINGHAM, G. E., and others. *Diagnostic and Remedial Teaching in First-Year Algebra*. (Evanston, Illinois: Northwestern University, 1933)
- (12) BUSWELL, G. T. *The Vocabulary of Arithmetic*. Supplementary Educational Monograph, No. 28. (Chicago: University of Chicago Press, 1931)
- (13) BUSWELL, G. T., and JOHN, L. *Diagnostic Studies in Arithmetic*. Supple-

mentary Educational Monograph, No 30 (Chicago University of Chicago Press, 1926)

(14) CADWELL, A. G. *Arithmetic Activities* (Cleveland: Board of Education, 1931)

(15) CLAPP, F. *The Number Combinations, Their Relative Difficulty, and the Frequency of Their Appearance in Textbooks.* (Madison, Wisconsin; University of Wisconsin, 1924)

(16) "Educational Diagnosis." *Thirty-Fourth Yearbook of this Society*, 1935, 270-271.

(17) GROSSNICKLE, F. "Concepts in social arithmetic for the eighth-grade level." *Jour. of Educ. Research*, 30: 475-488.

(18) GROSSNICKLE, F. "An experiment with two methods of estimation of the quotient." *Elem. Sch. Jour.* 37 668-677.

(19) GUNDERSON, A. "The nature and content of arithmetic in readers in Grades 1 and 2" *Elem. Sch. Jour.*, 36: 527-540.

(20) GUNDLACH, W. B. "Ability of high-school students in common fractions." *Jour. of Educ. Research*, 29: 347-354.

(21) HANNA, P. "Opportunities for the Use of Arithmetic in an Activity Program." Chapter 5 in "The Teaching of Arithmetic," *Tenth Yearbook of the National Council of Teachers of Mathematics*. (New York: Bureau of Publications, Teachers College, Columbia University, 1935)

(22) HARAP, H. L., and MAPES, E. "The learning of decimals in an arithmetic activity program." *Jour. of Educ. Research*, 29: 686-693

(23) HARAP, H. L., and MAPES, E. "Learning the fundamentals in an activity curriculum." *Elem. Sch. Jour.*, 34: 515-526.

(24) HILDRETH, G. "Number readiness and progress in arithmetic." *Jour. of Experimental Educ.*, 4: 1-6.

(25) HUGHES, A. *A Unit of Work: Carrying the Mail.* (New York: Teachers College, Columbia University, 1933)

(26) JOHN, L. "The effect of using the long division form in teaching division by one-digit numbers." *Elem. Sch. Jour.*, 30: 675-692.

(27) JUDD, C. H. *Psychological Analysis of the Fundamentals of Arithmetic.* (Chicago: The University of Chicago Press, 1927)

(28) KNIGHT, F. B., and BEHRENS, M. *Learning the 100 Addition Combinations and the 100 Subtraction Combinations.* (New York: Longmans, Green and Company, 1928)

(29) MACGREGOR, G. *Achievement Tests in the Primary School.* (Publication of the Scottish Council for Research in Education, VI. London: University of London Press, Ltd., 1934)

(30) MATTHEWS, C. O. *The Grade Placement of Materials in the Social Studies.* Contributions to Education, No. 241. (New York: Teachers College, Columbia University, 1926)

(31) McLAUGHLIN, K. "Number ability of preschool children." *Childhood Education*, 11: 348-353.

(32) NOREM, G. M., and KNIGHT, F. B. "The Learning of the 100 Multiplication Combinations." In *Twenty-Ninth Yearbook of this Society*, 1930

(33) POLKINGHORNE, A. "Young children and fractions." *Childhood Education*, 11: 354-358.

(34) PRESSEY, L. C., and MOORE, W. S. "Growth of mathematical vocabulary from the third grade through high school" *School Review*, 40: 449-454.

(35) REM, FLORENCE "Incidental number situations in the first grade." *Jour. of Educ. Research*, 30: 36-43.

(36) RUCH, G. M. "The relative difficulty of the 100 multiplication combinations with special reference to textbook construction." *Elem. Sch. Jour.*, 32: 369-377.

(37) SCHAEFER, G. "An informational unit on time" *Elem. Sch. Jour.*, 38: 114-117

(38) SMITH, NILA B. "An investigation of the uses of number in the out-of-school life of first-grade children" *Elem. Sch. Jour.*, 24: 621-626.

(39) STEEL, H. J. "Time activity analysis technique applied to the supervision of arithmetic." "Scientific Method in Supervision" *Second Yearbook of the National Conference on Educational Method*, 1929, 33-145.

(40) TAYLOR, J. S. "Omitting arithmetic in the first year." *Educ. Admin. and Superv.*, 2: 87-93.

(41) TERMAN, L. M., and MERRILL, MAUD. *Measuring Intelligence* (Boston: Houghton Mifflin Company, 1937)

(42) WAHLSTROM, EBBA. "The computational arithmetic of social experiences of third-grade children." *Jour. of Educ. Research*, 30: 124-129.

(43) WARREN, DOROTHY E., and BURTON, W. H. "Knowledge of simple business practices possessed by intermediate-grade pupils." *Elem. Sch. Jour.*, 35: 511-516.

(44) WASHBURN, C. W. "The values, limitations, and applications of the findings of the Committee of Seven." *Jour. of Educ. Research*, 29: 694-707.

(45) WASHBURN, C. W. "When should we teach arithmetic? A Committee of Seven investigation" *Elem. Sch. Jour.*, 28: 659-665.

(46) WASHBURN, C. W. "Mental age and the arithmetic curriculum. A summary of the Committee of Seven grade-placement investigations to date" *Jour. of Educ. Research*, 23: 210-231.

(47) WASHBURN, C. W., and VOGEL, MABEL. "Are any number combinations inherently difficult?" *Jour. of Educ. Research*, April, 1928.

(48) WILSON, G. M. "New standards in arithmetic." *Jour. of Educ. Research*, 22: 351-360.

(49) WILSON, G. M., and DALYRUMPLE, C. O. "Useful fractions." *Jour. of Educ. Research*, 30: 341-347.

(50) WOODY, C. "The nature and amount of arithmetic in types of reading material for the elementary school" *Educational Outlook*, 6: 199-217.

(51) WOODY, C. "The arithmetical backgrounds of young children." *Jour. of Educ. Research*, 30: 188-201.

CHAPTER XVI

THE WORK OF THE COMMITTEE OF SEVEN ON GRADE-PLACEMENT IN ARITHMETIC

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Reasonably full treatment is given in this chapter to the work of the Committee of Seven of the Northern Illinois Conference on Supervision¹ for the following reasons: The experiments in placement conducted by the Committee of Seven have been directly in line with the general purpose of the Yearbook and have been the first and most extensive investigations in this field. They began in 1926 and are still continuing. They have consisted of controlled, coöperative experiments in 255 cities and towns in 16 states, involving 1190 teachers and 30,744 children. They have been reported repeatedly in educational literature and have had a direct effect upon courses of study in both the United States and Canada and upon textbook construction. They are suggestive as to techniques that might well be used in fields other than arithmetic in determining the relation of the curriculum to levels of child development, and they have indicated the nature of further research needed both on the problem of arithmetic placement and on the problem of placement in general. While the conclusions of the Committee of Seven are tentative and subject to well-recognized limitations, they nevertheless point to definite practical procedures in regard

¹ The Committee of Seven has consisted, during the period covered by most of this report, of the following persons: Orville T. Bright, Superintendent of Schools, Flossmoor; Turner C. Chandler, Principal of the Burnside School, Chicago; Harry O. Gillet, Principal of the University of Chicago Elementary School; J. R. Harper, Superintendent of Schools, Wilmette; Raymond Osborne, while Principal of the Francis W. Parker School, Chicago; O. E. Peterson, Head of the Department of Education, Northern Illinois State Teachers College, DeKalb; Howard C. Storm, Superintendent of Schools, Batavia; and Carleton Washburne, Superintendent of Schools, Winnetka, *Chairman*. Mabel Vogel Morphett, Director of Research in the Winnetka Public Schools, and William H. Voas, Psychologist in the Winnetka Public Schools, have been associates of the Committee.

to the placement of arithmetic topics and are therefore usable by classroom teachers, textbook-makers, and curriculum-revisers who prefer even tentative and limited recommendations based upon research to a purely traditional or subjective plan of curriculum construction.

I. THE TECHNIQUES OF THE COMMITTEE OF SEVEN EXPERIMENTS

The techniques of the Committee of Seven have been sufficiently described in educational literature to make any detailed description of them here unnecessary (3a, 9, 14, 23, 24, 31, 33, 34). They may, however, be very briefly summarized as follows:

The approximate grade-placement of a unit of arithmetic has been determined either by a survey of practice or by preliminary experiments in a few schools. Using this approximate placement as a 'central grade' the coöperation has been secured of schools willing to teach the topic at the central grade, or one grade lower, or one or two grades higher. The spread of mental ages within each group of the coöperating three or four grades results in a distribution of mental ages in the final scores covering usually at least five or six years.

The children in the coöperating schools are given intelligence tests to determine their mental ages, are given pretests to determine their existing knowledge of the topic to be taught, and are given foundations tests to discover whether or not they have the prerequisite knowledge and skill, and in some cases the prerequisite experience and concepts, for learning the new topic. A brief teaching time is allowed after the giving of the first form of the foundations test for the teacher to attempt to bring the children to a reasonable mastery of such foundations as seem to be lacking. Then a second form of the foundations test is given, and retention test results are later compared with the results of this second form of foundations test and those of the intelligence test.

The pretests, several intermediate 'teaching tests,' the 'final test,' given at the close of the teaching period, and the 'retention test,' given six weeks after the final test, are all practically equivalent forms of one test, devised to cover all the major elements and difficulties of the topic under investigation. While exact equivalence among these forms is not determined statistically (and has no bearing on the results), they correspond problem by problem as to the elements of difficulty to be tested. The pretest is used to determine (a) the degree of knowledge children have of the topic under consideration before teaching begins, and (b) which children, presumably on account of grade repetition or transfer from another school, have had so much previous instruction in

the topic that their scores on the retention test should be disregarded. The teaching tests are used during the teaching period as a means of helping the teacher to determine the progress of her children. The final test is used at the close of the teaching period to determine the immediate learning of the children. And then, six weeks later, with no intervening review, the retention test is given. The Committee's recommendations are all in terms of the retention-test scores.¹

The results of the retention test are plotted against the results secured on the foundations test and against the scores on the intelligence test. In most experiments it is found that scores on the foundations test that fall below a certain point result in failure in learning the new topic, regardless of mental age. Children who make such low scores on foundations are therefore omitted from the final tabulation. Likewise children are eliminated whose knowledge of the topic to be taught is shown by the pretest to be so great as to indicate previous teaching of the topic. Recommendations are therefore based upon the retention of children who have not had considerable previous knowledge of the topic, but who have achieved a fairly adequate mastery of prerequisite topics and, in some cases, of prerequisite concepts.

Time and method of teaching are controlled.² Using preliminary experiments in their own schools as a basis, the members of the Committee of Seven specify the number of minutes per day and the number of weeks that a topic is to be taught and prepare a general teaching outline indicating methods to be used.³ While unquestionably children

¹ The relation between retention-test scores and final-test scores tends to rise with increased mental age. Thus, in the case of short division (see Fig. 1C), the average retention score for children with an M.A. of 7 years, 11 months, was only 72 percent of the final test score; that is, the children lost over one-fourth of their skill in six weeks. But for those of an M.A. of 11 years, 9 months, retention was 87 percent of the skill at the close of teaching; that is, the loss was less than half as great.

² Time was not strictly controlled, however, in certain of the very earliest experiments.

³ In the case of some experiments, the tests and teaching outlines have been published (usually in mimeographed form) and are available either in the Research Department of the Winnetka Public Schools or at the Winnetka Educational Press (4, 5, 6, 7, 8). In all other cases the Research Department of the Winnetka Public Schools is glad to furnish information or to have any interested person inspect the files and gather such information as he wishes. Graphs on all topics are available for inspection, but limitation of space in various publications in which the Committee's work has been reported from time to time has made any complete publication of the Committee's graphs impracticable. A number of the most significant graphs are shown in smoothed form in this chapter.

in the experiments come from different kinds of home backgrounds and have different types of experience, while they have had their earlier arithmetical instruction in a variety of textbooks and under a variety of teaching methods and school systems, and while the teachers who attempt to follow the outlines of the Committee of Seven undoubtedly vary their methods in accordance with their own experience and ability, the number of children and teachers is such as to make these differences tend to cancel each other.

II. THE METHOD OF INTERPRETING THE DATA

The Committee has handled the data in two ways, first by plotting the *average scores* made by children on the retention tests against their mental ages, and second by plotting the *percent of children making a score of 80 percent* (or occasionally 75 percent) on the retention test against their mental ages (see Fig. 1, A). Both curves usually tend to assume the S form (see Figs. 1-5) — or appear to be fragments of an S curve — relatively flat at the lower mental ages, rising with steadily increasing steepness as the mental age increases, then reaching a point of flexion and tending to flatten out again. The method of plotting average scores against mental age is free from the criticism of arbitrariness of standard, but the method of plotting percentage of children who reach an acceptable score at each mental age has seemed to the Committee to be of more practical value to classroom teachers. Actually, the point of flexion in both curves tends to occur at about the same mental age for a given topic (Fig. 1, A). When, however, it occurs after three-fourths of the children can achieve 80 percent mastery on the retention test, the Committee of Seven has felt that many schools would be quite willing to teach the topic at this lower level without waiting for the optimal mental age indicated by the point of flexion. Conversely, when the point of flexion occurs before three-fourths of the children can retain that mastery and the curve continues to rise, even though less steeply, beyond this point, the Committee has felt that many teachers would prefer to postpone the teaching of the topic (to completion) until they were reasonably sure that three-fourths of their children would achieve satisfactory mastery.

Obviously, if a teacher or a school system is satisfied to have a smaller percentage of children reach mastery or is willing to use a lower standard of mastery, lower levels of mental age may be chosen as the points at which to teach the various topics.

Explanation of Graphs

The graphs on this and the following pages are illustrative of the hundreds of graphs prepared by the Committee of Seven in connection with its various studies. The first three sets (Figures 1, 2, and 3) are taken from the studies dealing with the various arithmetic processes and illustrate techniques used by the Committee in formulating its recommendations. Those following (Figures 4 and 5) are from the recent studies on measurements and indicate successive levels at which different aspects of linear, square, and time measure can be taught.

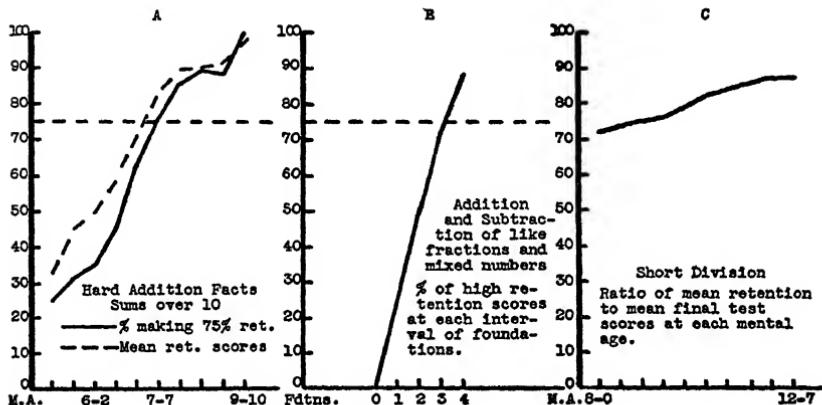


FIG. 1

Figure 1, A, illustrates the similarity of form between graphs prepared on the committee's usual, though arbitrary, standard of the percentage of children making scores of 75 to 80 percent or higher at various levels of maturity (shown by the solid line) and the graph of mean retention scores, not subject to any arbitrary recommendation. This graph pertains to scores made on a test of 32 addition facts with sums over 10.

Figure 1, B, illustrates the striking relation between foundations concepts and the learning of a new process. The test graphed is one in addition and subtraction of fractions and mixed numbers (40 examples). The base line represents scores on a foundations test made up of the following four problems: (1) A stick of candy is illustrated broken into five parts. "What is each part called?" (2) A measuring cup is shown marked into four equal parts, the bottom three being blackened. "What part is colored black?" (3) "A pint is what part of a quart?" (4) Two ladders are pictured, the first being $\frac{3}{5}$ as high as the second one, as shown by the number of steps. The pupil indicates whether the first is $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, or $\frac{3}{5}$ as high as the second.

Figure 1, C, illustrates the typical ratio of retention-test scores, six weeks after teaching, to final test scores immediately after teaching. Retention-test

scores have been used in making all recommendations. This graph pertains to examples in short division, ranging from one as simple as $3\overline{)639}$ to one as difficult as $7\overline{)8000}$. All difficulties are included.

In Figure 2, A, and all subsequent figures the vertical scale represents the percentage of children making satisfactory scores on the retention test (usually 75 to 80); the horizontal scale represents successive intervals of mental age, with the mental age shown at the middle of the interval. Thus, in this graph, read the solid line as follows: At a mental age of 10 years, 5 months, 38 percent of the children made satisfactory retention-test scores; at 11-2, 65 percent made

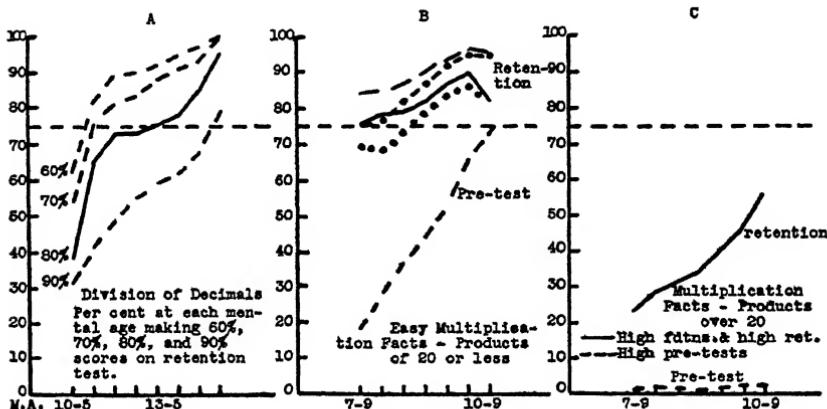


FIG. 2

such scores; at 11-10, 73 percent, etc. In each case the 75 percent point on the vertical scale is carried horizontally to the right by dashes. The mental age at which the graph intersects this line of dashes is approximately the minimal mental age at which the Committee of Seven recommends that the topic be taught.

This particular graph, pertaining to the division of decimals, shows the effect of raising and lowering the Committee's arbitrary standard (75 to 80 percent correct) for satisfactory retention. The bottom line shows the percentage of children at each mental level who made scores of 90 percent or higher on the retention test; the next line (solid) those making 80 percent scores (the Committee's usual standard); the next, 70 percent; and the top line, 60 percent. Note that dropping the standard from 80 percent to 60 percent only lowers the teaching level from a mental age of 11-10 to a mental age of 11-2.

Figure 2, B, illustrates a detailed study of the easy multiplication facts (products of 20 or less). The line at the bottom (dashes) represents pretest scores; the four upper lines represent different ways of treating retention-test results. The next to the top line (dash-dot) represents the percentage of all children making satisfactory retention-test scores at each mental-age level,

regardless of their 'foundations' and pretest scores. The other three lines represent the percentage of satisfactory retention-test scores made by (a) all children with adequate foundations (dashes), (b) all children with low pretests (dots), (c) all with adequate foundations and low pretests (solid). This last (solid) line is that used by the Committee in making its recommendations.

Figure 2, C, presents pretest and retention-test scores on multiplication facts with products over 20. Note that almost no children at any level tested had high pretest scores and that retention tests at a mental age 10-9 show that only 56 percent of the children made satisfactory scores (76 percent or better).

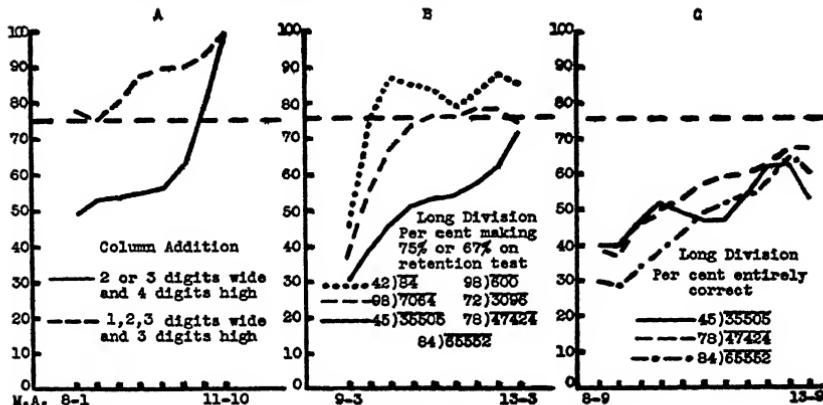


FIG. 3

Figure 3, A. This graph shows the marked effect of mental age in handling relatively simple, and relatively difficult, addition examples involving exactly the same processes. The upper line (dashes) represents retention-test scores of 75 percent or higher on a test involving such examples as the following:

4	878	953	66
7	96	636	77
2			59

The lower line (solid) represents scores of 67 percent or higher, on a test involving one column two digits wide and four digits high and two columns three digits wide and four digits high. There is a difference of over two years between the mental age at which the easier column addition can be handled effectively, and that at which the four-digit-high columns can be successfully handled.

Figure 3, B, is an example of the same principle in the case of long division. The top line (dots) represents retention-test scores of 75 percent or higher on four division problems having two-place divisors and *one*-place quotients, including naught, remainder, and trial divisor. The second line (dashes) represents scores of 67 percent or higher on three examples having two-place divisors

and *two-place* quotients (all difficulties). The bottom line (solid) shows retention scores of 67 percent or higher on three examples involving two-place divisors and *three-place* quotients.

Figure 3, C. The bottom line in the preceding graph is here separated into three lines, each representing the percentage of children at successive mental levels getting one particular example right. The three examples are shown on the graph.

Figures 4 and 5 present eighteen graphs from the Committee of Seven studies on linear, square, and time measure. Detailed explanations, graph by graph, are not necessary, as the type of problem is indicated on each graph itself. In each case the lower line (dashes) represents pretest scores; *i.e.*, knowledge of the topic before systematic teaching was begun in the experiment. The upper line (solid) represents retention-test scores six weeks after the close of teaching, with children who made high pretest scores eliminated. Foundations-test scores have been ignored in these data because, for the tests on measurement, they proved, for the most part, to have negligible influence on retention.

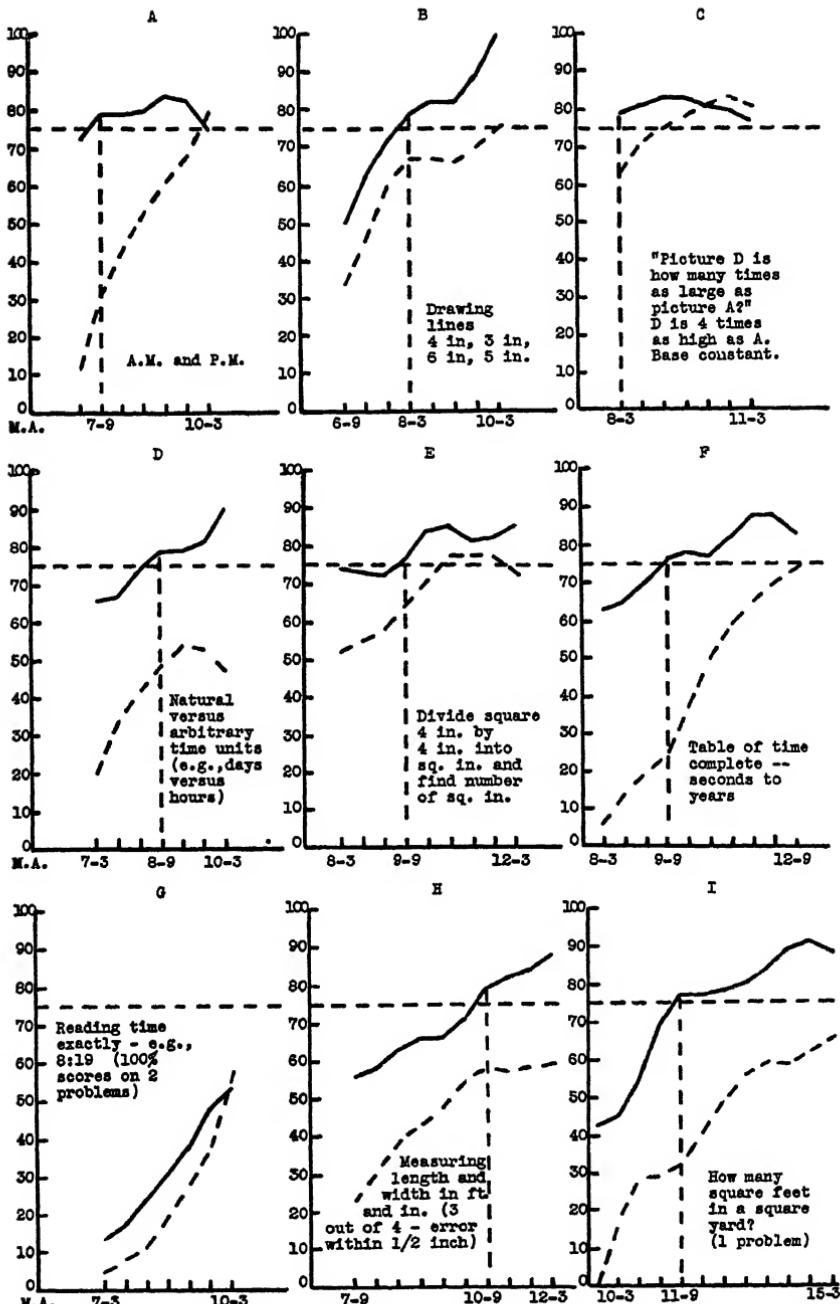


FIG. 4

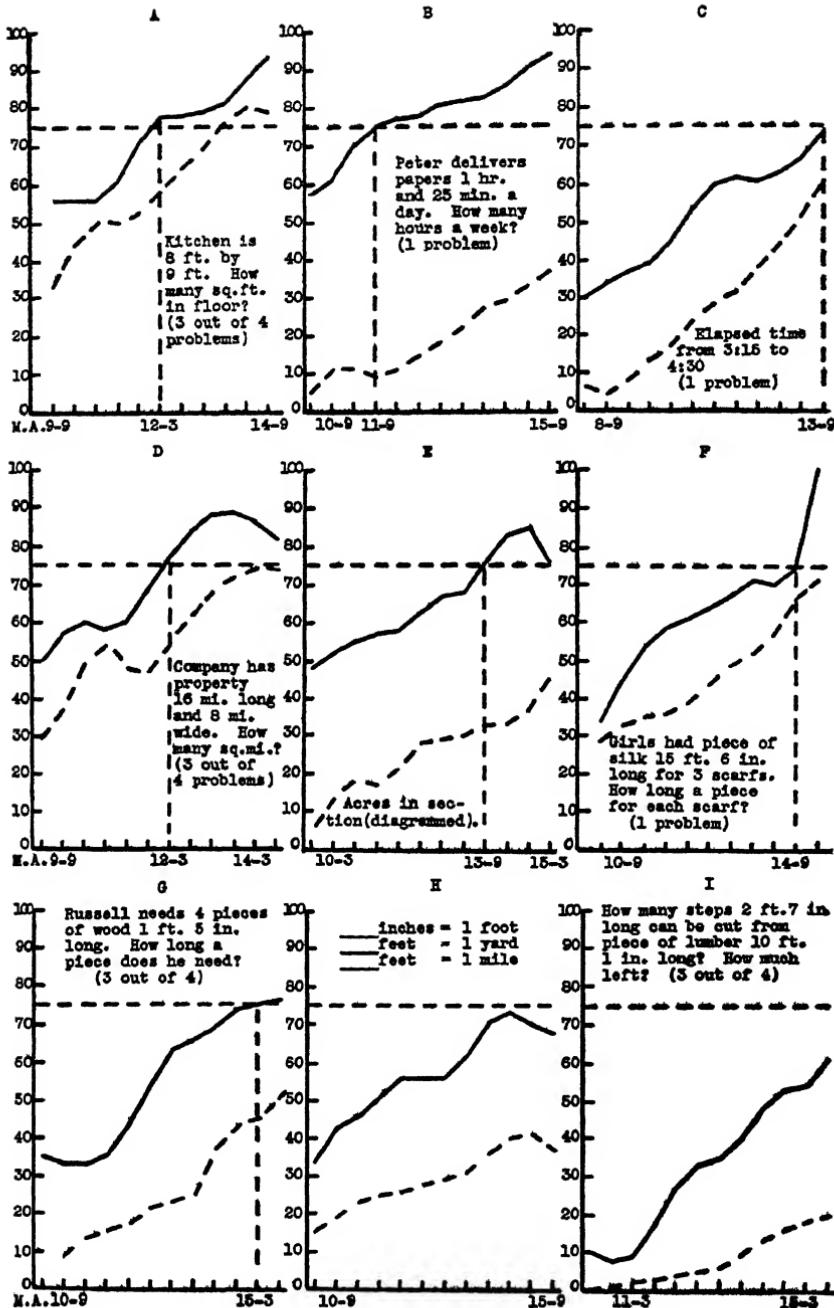


FIG. 5

III. A SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF THE COMMITTEE OF SEVEN TO DATE

A summary of all the findings of the Committee of Seven to date is appropriate for this Yearbook. It should be emphasized that these findings are tentative, that they are subject to the limitations outlined later in this chapter, that the research suggested later in this chapter may materially modify some of the recommendations, and that teachers who are willing to spend more time, or accept lower standards of achievement, or to present a subject before three-fourths of the children can master it may legitimately attempt the subject at a lower level, while those whose standards are higher or whose time is more limited may legitimately postpone a given item until a higher level. It should also be pointed out that these are, except as otherwise indicated, *terminal* placements; *i.e.*, the placements at which the topics can be learned to completion. How much earlier the topics may legitimately be introduced, the Committee's data do not show. Finally, it should be borne in mind that all recommendations as to mental-age placement presuppose reasonable mastery of foundations; *i.e.*, possession of the knowledge and skill pertaining to prerequisite topics.

DATA AND RECOMMENDATIONS FOR PLACEMENT

Mental Age 6-7

While children at this mental age can learn the addition facts with sums of 10 and under and the easy subtraction facts, there is much doubt whether systematic instruction in arithmetic should begin so early. Even these two elements are better learned a year later. Experimental evidence is beginning to accumulate to indicate that this year, and possibly the next, should be devoted largely to informal experience and activities to give children real concepts of numbers and space relations, without any systematic drills.

Mental Age 7-8

The addition facts with sums of 10 and under are well learned at this level, and there is little gain in further postponement. The harder addition facts and the easy subtraction facts can be successfully learned at this age, but there is a definite gain in postponing them to the next level. The desirability of systematic drill in these facts at this level is open to question, in spite of the fact that it produces satisfactory results. Many persons feel, and there is some evidence to justify the feeling, that the informal experiences and activities of mental level 6-7 should be continued and extended at this level and that systematic drill of all sorts should be postponed to the next one.

Simple comparisons of length, height, thickness, width, and the like, includ-

ing the recognition that one object is two, three, or four times as high, wide, long, thick, or deep as another, are well learned. Children can also readily learn to measure lines in even inches, and, with more difficulty, to draw lines an even number of inches long. They can learn how many inches there are in a foot and in two feet.

Children can learn to read the clock on the even hour, to distinguish between morning and afternoon, and to understand the symbols *a.m.* and *p.m.*

Mental Age 8-9

The elements assigned to the previous level can be postponed to this level with advantage. Children can also learn the more difficult subtraction facts, although there is some gain in postponing these another year. They can learn to subtract three-digit numbers from three-digit numbers as far as the handling of the mechanics is concerned, but there is reasonable ground for doubt whether such numbers have any real meaning to them.

The easy multiplication facts can be taught at this level very effectively. Multiplication facts fall, with a few exceptions, into two categories, those with products of 20 and less, and those with products of more than 20. The former belong definitely at this level; the latter about three years later. An exception is 5×5 , which was correctly retained by 89 percent of children of mental age 8. An exception in the other direction is 4×3 (with the 3 written above the 4). This was correctly retained by only 68 percent of 8-year-olds. In general, however, this is the obvious level for the multiplication facts with products of 20 and less, provided children have an adequate foundation in the addition facts.

The simplest forms of square measure belong here, involving a recognition of areas two, three, or four times as large as a given area, when either the height or the base is held constant. Under the same conditions the children can recognize whether a rectangular area is half as large as a given one, and, using a square inch of cardboard as a measuring device, can learn to compare areas where both height and base differ in such problems as, "Is this picture three times, four times, or six times as large as the square inch of cardboard?"

In time measure, children can learn to distinguish standardized units, such as minutes, hours, and days, from unstandardized units, such as length of time to walk a block. They can learn to read clocks to the half and quarter hour and to read the calendar. On the calendar they can count the elapsed days within the same month. They can learn a simple table of time, including minutes, hours, days, and weeks.

Mental Age 9-10

Column addition with columns not more than three digits high and three digits wide can be learned at this level as far as accuracy of computation is concerned. Question may legitimately be raised as to the meaning and use of such columns at this level, but research on the point is lacking.

It is probable that simple multiplication involving no partial products over 20 should be introduced at this level. The Committee is carrying on research

now to investigate this hypothesis. It is highly probable that the easy division facts (dividends of 20 and less) can be introduced here or even at the level below, since there is a very high correlation between the learning of the division facts and the learning of the multiplication facts. The Committee is analyzing the division facts one by one to verify this. Similarly, there is some ground for supposing that short division in which no partial dividends exceed 20 may belong here. Again, research is in progress to determine this finally.

The meaning of simple fractions of a whole object definitely belongs at this level. Children can learn to recognize and distinguish half of an object, a third, a fourth, three-fourths, and so forth. ('Half' can be learned much earlier.)

In linear measure children can learn the relation of inches, feet, and yards, the number of feet in one yard and two yards, and the number of inches in a yard. They can compare length, height, width, and so forth, involving the practical concepts of one-half, one-third, and one-fourth — again, the concept of one-half can be taught earlier.

In square measure, likewise, children can recognize that a given rectangle is a half, a third, a fourth, or an eighth as large as a specified one when either height or base is held constant. They can learn to get areas of rectangles by dividing them up into square inches with a ruler, and do this with very little instruction. They can learn to recognize a square foot drawn on a blackboard as distinguished from a six-inch square or a square $18'' \times 18''$ or larger — indeed, they can do this in many cases without systematic instruction. Using a ruler and pencil, they can learn how many square inches there are in a square foot; one may well question, however, the value of learning this here — it may develop a concept which has later use, but it is probably not related to any need, interest, or use of children at this level.

Mental Age 10-11

Column addition four digits high and three digits wide can be done accurately at this mental age. Children can understand the meaning of simple decimals and can learn to add and subtract them. Common observation indicates that where the adding and subtracting of decimals involves only dollars and cents and does not require the supplying of naughts, children can learn these earlier. If the very doubtful procedure of adding and subtracting 'ragged' decimals is to be taught, the optimal age is considerably higher than this, and even the minimal age is one level higher.

The addition and subtraction of fractions and mixed numbers with like denominators, if confined to the ones commonly used in life, can be successfully learned at this level. If fractions are kept simple enough and mixed numbers are not included, this unit can go even into the preceding level.

Simple bar graphs not involving computation and fractional estimates can be learned very successfully, including both the reading of such graphs and the making of them.

In linear measure children can effectively measure in feet and inches and measure and draw lines accurately to the quarter of an inch. They can learn to estimate roughly such lengths as that of the classroom, although this ability bears very little relation to mental age and can be taught almost equally well from a mental level of 9 to a mental level of 12 or 13. Similarly, the 10-year level is as good as any, but not much better, for teaching children to recognize what units of measure are used to express the distance between cities, the length of a piece of cloth, the height of a building, the length of a farm.

When dimensions are given in whole feet, children can learn, with systematic instruction, to get perimeters. Likewise, very simple problems in subtraction of feet and inches, involving no borrowing and well within the children's experience, can be taught at this mental age. Even the multiplication of feet and inches in such a problem as the following can be taught here very successfully: "The table Ralph is making needs four legs, each one 2 feet, 1 inch, long. How long a piece of lumber must he have to make all four legs?"

In time measure, children can now complete the table of time from seconds up to leap years, including days in a year and weeks in a year. They can learn to read clocks accurately to the minute and to express time accurately to the minute in the form '10:22 P.M.' They can learn to recognize the difference between arbitrary and natural time units, such as hours and minutes *versus* days and years. They can calculate time elapsed in even quarter hours within a given hour. Those who have the necessary ability in division can even calculate the number of minutes required, for instance, to walk one block if 30 minutes are required to walk 15 blocks, or the number of days to make one poster if 72 days are needed to make 9 posters.

Mental Age 11-12

Multiplication facts with products over 20 are not adequately learned at a mental age of 10 years, 9 months; only 56 percent of the children of this mental age make scores of 76 percent or more, even when they have an adequate foundation of addition facts. The Committee's data do not go above mental age 10-9 for multiplication facts, but the simple multiplication foundations test for long division would indicate that by a mental level of about 11 more satisfactory learning of all the multiplication facts is entirely possible.

Just as soon as the multiplication facts are all learned, simple multiplication with multiplicands up to four digits can be learned, and compound multiplication, with multiplicands as high as four digits and multipliers as high as three digits, can be learned from the standpoint of technical mastery. Again serious question may be raised whether such large numbers as are involved in the products of this type of multiplication are within the child's experience and whether the process therefore has either meaning or use to him.

Either before or after the learning of simple and compound multiplication, as soon as children know all the multiplication facts, they readily learn the division facts. Shortly thereafter they are reasonably successful with short

division,¹ although there is a gain in postponing this until the next level.

Long division with a two-place divisor and a one-place quotient is successfully learned at this level by children who know their multiplication and division facts — indeed, for the relatively smaller percentage of children who know their multiplication and division facts at a lower mental age, such long division problems can be acquired at that lower level. While the elements of remainder and trial divisor increase the difficulty of the examples, they do not raise this unit of long division above this level. As in the case of short division, long division with one-place quotient is somewhat more successfully taught at the next level higher. If the standard of success is two problems right out of three, long division with a two-place quotient (and two-place divisor) can also be successfully learned here. Further discussion appears under the next mental level.

Children can memorize the 'aliquot parts' (*i.e.*, fractional and decimal equivalents). They can divide decimals by integers and can multiply decimals by decimals.

This is the level at which square measure as a regular topic can be best introduced in its simpler form. For the first time children can recognize that an area is a certain number of times larger than another area when the height and base both differ and when the relationship is simple. They can recognize a square inch drawn on the blackboard as distinct from a half-inch square or a two-inch square — although this last is not clearly a function of mental age, as the curve for it is nearly flat. They can calculate the number of square feet or inches in a given area when the dimensions are given in even feet or inches. They can memorize the number of square inches in a square foot and both calculate and memorize the number of square feet in a square yard.

Mental Age 12-13

Long division with a two-place quotient involving naughts, remainder, and trial-divisor difficulties probably belongs at this level. The data available do not, unfortunately, show any standard of success between 67 percent and 100 percent. But a problem-by-problem analysis of the test data clearly puts the more difficult two-place quotient problems at a mental level of 12 years, 9 months.

The meaning of fractions of a group of objects belongs here, such as the recognition that three objects is a third of nine objects. Following this, children can learn the multiplication and division of fractions satisfactorily. To this level belong also Case I percentage and Case II percentage involving only simple division of decimals; *i.e.*, division of a decimal by a whole number.

¹ 'Short division' is used throughout this report to mean 'division by a one-place divisor.' Although the Committee's teaching materials used the traditional short division form rather than the probably superior long division form, the placement would not be changed had the long division form been used, since it is knowledge of the multiplication facts that is crucial, and either short division or the simpler forms of long division can be taught as soon as these facts are mastered.

Three distinct new elements of linear measure can satisfactorily be taught at this level, although all of them give better results if postponed to the following year. Children can draw and measure lines accurately to the eighth of an inch; can calculate the number of inches in a fraction of a yard; and can measure distances on maps with a scale of miles.

It is not until this mental level that children are successful in learning to recognize squares and oblongs as rectangles, distinguished from triangles, trapezoids, and the like. It is hard to believe, however, that with longer teaching and practice on this element it could not be taught earlier if there was any object in doing so.

Children can learn to recognize the relative sizes of rectangles marked off into squares — seeing that one is one-sixth as large as another, for example — with both base and height differing. With some difficulty they can learn how many small cards can be cut from a larger card when they are in readily divisible units, like the number of $3'' \times 5''$ cards that can be cut from a sheet $9'' \times 10''$. This unit is taught more economically at the next level higher.

Measure of volume is still being investigated.

In time measure, children can solve simple problems in the multiplication of hours and minutes, even involving the change of a product like 7 hours and 70 minutes to 8 hours and 10 minutes. This could even be taught at the preceding level were there other time units indicated therefor. It is not until the 12-year level that children can successfully count the elapsed weeks on a calendar from one month into the next and the elapsed days from one month into the next, and the elapsed hours and minutes from one hour to another hour, such as 8:45 to 10:30 or 8:45 A.M. to 4:15 P.M.

Mental Age 13-14

Long division with a three-place quotient, with or without the difficulties of naughts, remainders, and trial divisors, but still using a two-place divisor, is not taught successfully before this level. This is true whether tests are graded in terms of accuracy or in terms of correct process, disregarding mechanical errors. It should be remembered that the Committee's standard for successful teaching requires that three-fourths of the children retain the knowledge six weeks after teaching sufficiently well to make a satisfactory score¹ in a test involving all difficulties. Even at mental age 13-3, the Committee's standard is not quite reached; only 70 percent of the children score 67 percent or higher. Children at this level can learn to divide decimals or whole numbers by decimals and can complete Case II percentage.

In linear measure, children can learn to divide feet and inches by a whole number when both feet and inches are evenly divisible, and to divide yards by inches, making the necessary change in denomination in such problems as

¹ Because the long-division test used by the Committee of Seven included only three examples of this type, children getting either two or three of the three examples right were considered to have satisfactory achievement.

"Barbara is putting blue paper on her cupboard shelves. She has three yards of blue paper; the shelves are 27 inches long. How many shelves will this cover?"

In square measure children can learn to draw rectangles of a given number of square inches with varying bases given, such as drawing a 4-square-inch rectangle 2 inches wide. As a matter of fact, this particular problem can be learned at the level below, but when the problem involves a fraction, such as a base one-half inch wide, it is better learned at the level above.

While there is some doubt as to the children's realistic concept of the size of an acre and a square mile (see next level), they can get the area of a tract of land in square miles when the dimensions are given, even at the level below this. At this level they can learn how many acres there are in a square mile and calculate from a diagram the acres in half a section. Smaller fractions of a section, however, belong in the next level higher.

Mental Age 14-15

The usual textbook problems in addition and subtraction of unlike fractions involving the finding of common denominators and, in the case of the subtraction of mixed numbers, involving borrowing are not successfully learned below a mental age of 14. Much of this textbook material, however, is of very doubtful social use, so that it is possible that the lack of reality to the child is a factor in his failure to learn, as when, for example, he is asked to add $48\frac{1}{2}$ plus $76\frac{1}{2}$.

The manipulation of denominative numbers, involving the more complicated forms of applying the four fundamental processes to them and involving the changing of denominations, apparently cannot be effectively taught and retained until this level. Now, however, all practical forms of applying the fundamental operations of linear measure can be taught, although some of the more difficult ones, such as dividing 10 feet, 1 inch, by 2 feet, 7 inches, either require more practice than the Committee's experiment gave, or belong to a higher level.¹ In dividing feet and inches there is a marked contrast between the problems that 'come out even' and those that require more arithmetical manipulation. There is a three-year gap between the ability to learn to do such problems as the first and the second of the following samples: (1) "Paul has several pieces of lumber 3 feet, 2 inches, long. He wants to fill in a gap in the sidewalk 12 feet, 8 inches, long. How many pieces of his lumber would he need to fill the gap?" (2) "How long will each piece be if a 13-foot, 4 inch, plank is cut into four equal pieces?" The former belongs at the 14-year mental level and can be taught with reasonable success a year earlier; the latter is not satisfactorily learned until the 16-year mental level! In problems of this sort the type of division involved makes no difference; i.e., whether it be finding the size of a given part of a whole, finding how many parts of a

¹ The method taught was that of changing feet and inches to inches before dividing if division before changing did not come out even.

given size are contained in a whole, or finding by what number a part must be multiplied in order to give a whole — all are equal in difficulty.

A table of linear measure can be completed at this time, including feet in a rod and feet in a mile.

Square measure involving the finding of the number of acres in the usual fractions of a section belongs here. The familiar schoolroom problems of finding the number of square yards of linoleum needed to cover a floor, the dimensions of which are given in feet, is not successfully learned until this level. And it is not until somewhat later that city children are able, even with teaching, to estimate the number of acres in their school grounds or to diagram a square mile of land in the neighborhood by indicating street or road names. Yet it will be remembered that children's ability to manipulate acres and square miles, whether or not they understand them, comes earlier.

In time measure, as in linear measure, children can solve problems involving the fundamental operations applied to hours and minutes, and involving changes of denomination. Some of these problems, however, are apparently too difficult even at this mental age.

The foregoing recommendations, as already said, must not be taken rigidly. Often it is advantageous to teach a unit at a level higher than that recommended. Occasionally one may teach it at a level lower with very little loss in efficiency. In some cases the placement is very definitely indicated by the Committee's data. In some cases it is a matter of judgment as to which of two levels is the proper one — the smoothed graph may place the topic at one level, the unsmoothed one at the next one higher or lower. The general sequence and approximate placements as a whole, however, are thoroughly workable in a public school system and produce, according to the teachers who have used them, gratifying results. Actual research data as to the total results of such placements in comparison with the traditional placements are entirely lacking and should certainly be obtained.

IV. CRITICISMS OF THE COMMITTEE'S TECHNIQUES AND RECOMMENDATIONS

There have been so far only two published criticisms of the work of the Committee of Seven. For readers who desire a brief summary of these criticisms and of the reaction of the Committee, the following statements will be useful.

Raths (16) criticized the Committee's techniques as a result of a meticulous statistical study of the experiment in the addition and subtraction of fractions. His primary criticism was that when a regression equation was worked out involving retention tests, intelligence tests, and each of the four elements of the foundations test, the inclusion of intelligence tests only raised the multiple

correlation from .65 to .66, and that therefore the use of intelligence tests in predicting a child's readiness was unjustifiable and an unnecessary waste of time and money. Second, he questioned the validity and reliability of the tests used by the Committee of Seven. Third, he raised, without answering, a group of questions as to the general criteria of readiness, saying, for example, "a topic might be placed where it is most useful in the light of its value in teaching other courses, it might be placed where it is most interesting, it might be placed where it is closest to the time of use in life, or a combination of these factors might be considered."

Washburne's reply (21) to these criticisms was in substance as follows: Many of the experiments of the Committee of Seven result in S curves that are not "sensibly linear" and therefore cannot be properly treated by the regression technique. Furthermore, when the actual data are examined and foundations-test scores are held constant, there is a definite rise in the proportion of children who achieve success as mental age increases. Again, as a practical schoolroom procedure, the working out of a regression equation for each child in the classroom, to determine whether or not he is ready to undertake a new topic, is hopelessly impractical, as well as being, where the curves are non-linear, statistically improper. Second, there are inherent evidences in the Committee's data to indicate a practical degree of reliability and validity of the tests. And third, the various questions raised by Raths as to criteria of readiness had also been raised by the Committee and can only be answered by further experimentation, which the Committee of Seven would be glad to encourage in every possible way.

Raths (18) replies to this answer, and Washburne and Voas (26) reply in return. Raths (17) has a last word, and the issue is not further discussed. Anyone interested in the technical details of this debate will find these references worth reading in full.

Brownell (2, 3) attacked the practical implications of the Committee's findings on the ground that, the experiment being controlled, the findings were open to question unless exactly the same time, method, and control were used by the teacher. He maintained that the experiments of Beall (1) and Grossnickle (10) disproved the Committee's findings on long division. He also elaborated upon the limitations of the Committee's findings as pointed out by the Committee itself, particularly the fact that the tests, for the most part, only indicated the level of a child's development at which he could complete the learning of a topic with all its difficulties and that therefore the time for beginning the instruction was in no way indicated. Finally, he criticized what he alleged to be the Committee's inconsistent theories of maturity: he claimed that the Committee in some of its reports implied that there was a growth from within that determined readiness, in other reports that mental age was the evidence of readiness, but in still other reports acknowledged the rôle of experience in determining readiness.

Washburne (27) replied to Brownell as follows: First, any controlled experiment is subject to limitations, and if controlled experiments in education

are of no practical value except where the exact experimental set-up is repeated, we might as well give up any experimentation in approaching educational problems. That Brownell does not seriously mean this is indicated by the fact that he considered the findings of Beall's and Grossnickle's controlled and more limited experiments to have general validity for placement. Second, Beall's experiment (1) was not a grade-placement study, having been conducted only in low fourth grades in Tulsa; but its findings tend to support those of the Committee of Seven, showing that only 50 percent of the children of this level reach or exceed the very low standard of three problems correct out of eleven in the Compass Diagnostic Test, the first problem of which is in short division. Grossnickle's experiment (10) was made with children in two New Jersey communities, whose ability in short division was unusually great ("The number of errors is lower than the number for any of the groups of students in Grades V to XV [!], inclusive, who had taken the same test in a previous examination"); the teaching time was 50 percent greater; the tests were given immediately after teaching, and therefore do not represent retention six weeks later, as do those of the Committee of Seven; and success is measured by *mean* achievement, whereas the Committee of Seven standard is *lower quartile* achievement; *i.e.*, the Committee's recommendations are based on the mental age at which *three-fourths* of the children can achieve mastery. Therefore the Grossnickle results as published cannot be validly compared with those of the Committee of Seven and can neither verify nor controvert the Committee's findings. Third, Brownell's attention is called to the fact that the Committee definitely states that its findings apply only to the teaching to *completion* of certain topics (33), and that further research is necessary to determine the best time for teaching the various simpler elements of these topics. Fourth, any definite theory of maturation is disclaimed and it is pointed out that mental age, which is the criterion that is used most often, is probably a combination of inner growth functions and the child's experience, and that therefore there is no inconsistency in implying that both are factors in maturation. The Committee's data are in no sense dependent upon any theory of maturing (27). They merely show that probability of success in undertaking to master certain topics in arithmetic is greatly increased by waiting until a child has achieved certain prerequisite knowledge and has reached a given mental age.

V. LIMITATIONS OF THE COMMITTEE'S RESEARCH AND FINDINGS

The Committee of Seven has recognized the limitations of its experiments and the necessary tentativeness of its recommendations (33). It has used an experimental technique that controlled both time and method. The methods it has outlined have been those that are readily usable by most good schools and that are substantially the ones in use in many good schools. A variation in method and a variation in time do

not necessarily produce variations in results (27). On the other hand, a much more functional 'activities' approach, based upon children's actual experiences and their feeling of need, might produce results decidedly different from those produced by a more formal type of systematic instruction (11, 12, 13). The Committee of Seven is exceedingly desirous of further experimentation in which the placement effect of radical change in method and of time can be studied.

The Committee of Seven feels that its tests are subject to two clear limitations. In the first place, they are of the formal arithmetic test type; that is, they evaluate the child's knowledge by his ability to perform in the abstract the operation he has been taught. They do not usually evaluate the child's concepts, his realization of function, or his experiential understanding of the work. In the second place, the tests in a number of cases evaluate only the completion of the topic and fail to indicate at what levels the easier aspects of the topic can be effectively learned.

The foundations tests prepared by the Committee in a good many cases involve only formal skill in manipulation of arithmetic prerequisite to the topic to be learned. Thus the foundations test for long division, for example, is a test in simple multiplication, subtraction, and short division. Ideally the foundations tests would measure basic concepts and experiential background, as well as these more formal elements. In the tests on fractions and in some of the tests on measurements, an attempt was made in this direction.

The Committee's findings do not indicate what should be done administratively about the children who, although below the mental level fixed by the Committee of Seven, are able to undertake with success the learning of a given topic. Thus, for example, although a mental level of 8 years, 11 months, appears to be necessary for three-fourths or more of the children who know their addition and subtraction facts to achieve at least 75 percent mastery of such a subtraction process as is involved in taking 87 from 156, yet at a mental level of 8 years, 6 months, 58 percent of children are able to achieve this degree of success. Should these children wait until the others are ready, or should provision be made for them? Conversely, what should be done for the small minority of the children who at a mental age of nine years are still unsuccessful in learning the subtraction process? These questions obviously are outside the field in which the Committee of Seven can, on the basis of its data, make any recommendation.

The measures of readiness used by the Committee consisted of the

foundations test and the intelligence test. The Committee is well aware of the fact that more predictive measures may in the future be found. Measures of the children's concepts and experiences, their needs and interests, and measures of that phase of mental growth most closely correlated with success in arithmetic would presumably be more effective in determining children's readiness for a given topic than measures of mere knowledge of prerequisite skills and a general level of mental growth as measured by an intelligence test.

VI. RECENT RESEARCH BY THE COMMITTEE

Experiments by the Committee of Seven during the past five years have involved problem-solving, measurement, and a breakdown of some of the earlier studies into the various easier and more difficult elements.

The investigation of the placement of various types of verbal 'reasoning' problems has been only begun. Reports of what has been done, together with some interesting and challenging graphs of outcomes, are available (4, 6, 22, 30, 32). In the files of the Research Department of the Winnetka Public Schools are graphs for all of the 150 problems given in the tests. They show the percentage of pupils in each mental-age group who got correct answers. This investigation, however, is only in its beginnings. No recommendations regarding placement will be available for some time.

Studies on linear measure, square measure, and the measurement of time have recently been completed (31). These experiments are probably the most satisfactory of any carried forward by the Committee of Seven up to the present. The years of experience with the earlier studies and the criticisms that have come to the Committee on these studies have enabled it to approach these topics with especial thoroughness. Each topic has been subdivided, so that the levels of difficulty within each have been measured and a spiral course running from the primary grades through the junior high school has been indicated by the findings. Linear measure is not one subject but a composite of many sub-topics, each of which apparently has its appropriate teaching level. The same is true with the other types of measurement. Both the tests and the teaching methods in these measurement studies have been more objective and conceptual than in the case of previous experiments.

Ideally some of the earlier experiments of the Committee should be repeated and tested with more analytical tests than those originally used by the Committee; a number of the original tests have been of such a nature that an analysis has been possible. In the case of multiplica-

tion facts and long division, the analysis has already justified tentative recommendations in regard to placement.

VII. FURTHER RESEARCH THAT IS NEEDED

Further research is seriously needed to answer the following among other questions:

1. What will be the effect upon placement of greatly increased experiential background for the topic to be taught? For example, how much less difficult would the harder multiplication facts prove to be if the children had had many experiences with numbers corresponding to the higher products? The fact that 3×5 is practically as easy as $7 + 8$, for example, would seem to imply that the process of multiplication is not what causes the difficulty with the higher multiplication facts, but rather lack of familiarity with large numbers through a variety of experiences. Difficulty of multiplication facts increases markedly with size of product. This is only one example of many that raise the question as to the influence of concrete experience and a sense of reality upon readiness for a unit of learning.

2. What changes, if any, would be made in the placement of arithmetic topics if the method used were a functional and project type of teaching instead of a more formal and systematic type? Would, for example, such an approach as that of Harap and Mapes (11, 12, 13), carried on by a large number of teachers in many different schools and at various grade levels, yield the same sort of curve as have the experiments of the Committee of Seven, or would that curve indicate a lower or higher mental age as the most effective one for teaching this topic?

3. Within what limits does time spent in teaching condition effectiveness at various levels? For example, in the experiments of the Committee where thirty minutes a day was allowed, would sixty minutes a day have materially altered the results? Or, in experiments where six weeks were allowed for teaching a topic, would twelve weeks on that topic have materially altered the results? Or, when the method of the Committee of Seven called for teaching one topic intensively for several weeks from its simpler beginnings to completion, would a very different outcome have resulted had the topic been taught spirally over a period of several years; that is, would the mental age at which most children learn the subject to completion be materially modified?

4. What aspects of each topic can effectively be taught much earlier than the final mastery of the topic? The Committee of Seven has some data on this, as already indicated, but the same sort of tech-

nique as was applied in the field of measurements could to advantage be applied to many other arithmetic topics. The Committee has found, for example, that teaching column addition three digits wide and three digits high comes a year earlier than teaching column addition three digits wide and four digits high. If all processes were broken up in this way, what would be the levels of the various sub-topics?

5. What, if any, are the inherent difficulties of solving 'story' problems demanding 'reasoning,' and how do these differ from the difficulties of arithmetical processes? What would be the effect upon placement if we were to give a child a verbal problem with two or three steps instead of one—in long division, for example? Is there anything inherently easier or more difficult about stating a problem in story form rather than merely indicating the process and the figures, as in the case of abstract drill? The Committee of Seven has made a beginning of this study, but a great deal more needs to be done, not only by the Committee of Seven but by others, too.

6. What are children's needs at various levels of development and how far should these affect the curriculum? Thus far the Committee's studies have dealt merely with the level where we can effectively teach a topic and have sought no clue as to the social situations in and out of school that might make that topic necessary and useful to the child. It is conceivable, on the one hand, that the school should postpone the teaching of a topic until the child not only has the necessary maturity and prerequisite knowledge for it, but until he is also having reasonably frequent need for the topic in his life outside the school and in his school life during other than arithmetic periods. On the other hand, it is conceivable that it is the job of the school to provide experiences that will make the child realize the need for a topic approximately as soon as there is evidence that he can learn it effectively. In either case, an investigation of children's needs and interests in the field of arithmetic, exclusive of those artificially stimulated by the arithmetic period, would throw a useful light upon this whole subject.

7. The experiments of the Committee of Seven should be repeated by others under identical conditions and under conditions in which some one or two elements are varied, in order to verify and supplement the Committee's findings.

8. Finally, the total result of an arithmetic curriculum based on the Committee's recommendations should be examined in comparison with that of a more traditional curriculum.

BIBLIOGRAPHY

- (1) BEALL, ROSS H. *An Individual Instruction Unit in Long Division*. (Unpublished doctor's dissertation. Iowa City: The University of Iowa, 1932. 221 pp. and appendices)
- (2) BROWNELL, WILLIAM A. "A critique of the Committee of Seven's investigations on the grade placement of arithmetic topics." *Elem. Sch. Jour.*, 38: March, 1938, 495-508.
- (3) BROWNELL, WILLIAM A. "Readiness and the arithmetic curriculum." *Elem. Sch. Jour.*, 38: January, 1938, 344-354.
- (3a) CHANDLER, TURNER C. "Investigations in the placement of arithmetic topics." *Illinois Teacher*, 25: April, 1937, 240-241.
- (4) COMMITTEE OF SEVEN. *Classified Problems in Arithmetic*. (Mimeographed book of problems. Winnetka Educational Press, Winnetka, Illinois, 1934)
- (5) COMMITTEE OF SEVEN. *Meaning of Fractions Textbook*. (Published as Book VIII of the Washburne Individual Arithmetics. World Book Company, 1930. Also sold by Winnetka Educational Press, Winnetka, Illinois)
- (6) COMMITTEE OF SEVEN. "Preliminary report of the Sub-Committee on problem-solving." (Research Department, Winnetka Public Schools, Winnetka, Illinois, 1936)
- (7) COMMITTEE OF SEVEN. *Teaching of Linear Measure, Square Measure, and Time: Results of Experiments and Recommendations for Curricular Placement*. (Winnetka Educational Press, Winnetka, Illinois, 1938)
- (8) COMMITTEE OF SEVEN. *Tests in the Foundations Necessary for the Various Arithmetic Processes*. (Mimeographed book of tests. Winnetka Educational Press, Winnetka, Illinois, 1933)
- (9) GILLET, HARRY O. "Placement of arithmetic topics." *Journal of the National Educational Association*, 20: June, 1931, 199-200.
- (10) GROSSNICKLE, FOSTER E. "An experiment with two methods of estimation of the quotient." *Elem. Sch. Jour.*, 37: May, 1937, 668-677.
- (11) HARAP, HENRY L., and MAPES, CHARLOTTE E. "Learning the fundamentals in an activity curriculum" *Elem. Sch. Jour.*, 34: March, 1934, 515-525.
- (12) HARAP, HENRY L., and MAPES, CHARLOTTE E. "The learning of decimals in an arithmetic activity program." *Jour. of Educ. Research*, 29: May, 1936, 686-693.
- (13) MAPES, CHARLOTTE E., and HARAP, HENRY L. *Six Activity Units in Fractions*. (Mimeographed Curriculum Laboratory Bulletin 33. Cleveland: Western Reserve University, 1933. 19 pp.)
- (14) OSBORNE, RAYMOND W., and GILLET, HARRY O. "Mental age is important factor in teaching arithmetic." *The Nation's Schools*, 12: July, 1933, 19-24.
- (15) OSBORNE, RAYMOND W. "Report of the Committee of Seven: results of further investigations of the placement of arithmetic topics" (Research Dept., Winnetka Public Schools: mimeographed report for meeting of the Northern Illinois Conference on Supervision, at DeKalb, on May 8, 1931)
- (16) RATHS, LOUIS E. "Grade-placement of addition and subtraction of fractions." *Educ. Research Bulletin*, 11: January 20, 1932, 29-38. (Ohio State University)

- (17) RATHS, LOUIS E. "The last word. A reply to Mr Washburne's rebuttal" *Educ. Research Bulletin*, 11: November 23, 1932, 409-410 (Ohio State University)
- (18) RATHS, LOUIS E. "Once again A reply to Mr Washburne's criticism." *Educ. Research Bulletin*, 11: November 23, 1932, 401-405. (Ohio State University)
- (19) STORM, HOWARD. "How the Committee of Seven can help the teacher." *Illinois Teacher*, 23: April, 1935, 253-254.
- (20) WASHBURN, CARLETON. *Adjusting the School to the Child*. (Yonkers, N. Y. World Book Company, 1932) 32-48
- (21) WASHBURN, CARLETON "Arithmetic grade-placement investigations of the Committee of Seven: A reply to Louis E. Raths." *Educ. Research Bulletin*, 11. November 23, 1932, 396-410. (Ohio State University)
- (22) WASHBURN, CARLETON. "Comparison of two methods of teaching pupils to apply the mechanics of arithmetic to the solution of problems." *Elem. Sch. Jour.*, 27. June, 1927, 758-767
- (23) WASHBURN, CARLETON "Grade-placement of arithmetic topics" *Twenty-Ninth Yearbook* of this Society, 1930, 641-670
- (24) WASHBURN, CARLETON. "Mental age and the arithmetic curriculum — A summary of the Committee of Seven grade-placement investigations to date." *Jour. of Educ. Research*, 23 March, 1931, 210-231.
- (25) WASHBURN, CARLETON. "One reason children fail in arithmetic — A Committee of Seven investigation" *Progressive Education*, 9. March, 1932, 215-223.
- (26) WASHBURN, CARLETON, and VOAS, WILLIAM H "Rebuttal" *Educational Research Bulletin*, 11. November 23, 1932, 405-409. (Ohio State University)
- (27) WASHBURN, CARLETON "Reply to Brownell's critique of the Committee of Seven's investigations." *Elem. Sch. Jour.*, 39. February, 1939.
- (28) WASHBURN, CARLETON "Ripeness." *Progressive Education*, 13: February, 1936, 125-130.
- (29) WASHBURN, CARLETON. "Social practices in arithmetic fundamentals." *Elem. Sch. Jour.*, 27: September, 1926, 60-66.
- (30) WASHBURN, CARLETON, and OSBORNE, RAYMOND. "Solving arithmetic problems" Part I. *Elem. Sch. Jour.*, 27: November, 1926, 219-226; Part II, *ibid.*, 27: December, 1926, 296-304.
- (31) WASHBURN, CARLETON. "Teaching of linear measure, square measure, and time" *Elem. Sch. Jour.*, 39. March, 1939
- (32) WASHBURN, CARLETON, and MORPHETT, MABEL VOGEL. "Unfamiliar situations as a difficulty in solving arithmetic problems." (To supplement study reported in *Elem. Sch. Jour.* for November, 1926.) *Jour. of Educ. Research*, 18: October, 1928, 220-224.
- (33) WASHBURN, CARLETON. "The values, limitations, and applications of the findings of the Committee of Seven." *Jour. of Educ. Research*, 29: May, 1936, 694-707.
- (34) WASHBURN, CARLETON. "When should we teach arithmetic? — A Committee of Seven investigation." *Elem. Sch. Jour.*, 28: May, 1928, 659-665.
- (35) WASHBURN, CARLETON. "Why is arithmetic a bugbear?" *New Era*, 15: January, 1934, 17-23; also *Illinois Teacher*, 23: November, 1934, 69-71.

CHAPTER XVII

THE SOCIAL STUDIES

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I. INTRODUCTION

The conviction is growing that the development of a better understanding of the significant problems now facing our disordered society and the cultivation of the ability to deal with them more effectively are vital and major responsibilities of the school. The brunt of these responsibilities has fallen upon the social studies, and workers in the field have responded with much philosophizing and heroic lists of goals or objectives to be achieved. The outcomes have been conceived primarily in terms of what the child "ought" to know. Much less thinking has been done in terms of what the child needs, wants, enjoys, or is capable of mastering. Unfortunately, too, the preoccupation with *a priori* judgments, no matter what the point of view, has been so great that definitive research data dealing with the child's needs, interests, attitudes, skills, knowledge, aptitudes, concepts, problem-solving behavior, optimal learning procedures, and optimal learning sequences in the field of the social studies are sadly lacking.

In developing a program of social studies, the present interests, capacities, and sensed needs of the child should be employed to help him grow towards socially accepted goals, which should be clearly recognized as tentative. We should help the child to master the best available solutions of social problems, encourage him to develop a critical attitude towards these solutions, and assist him to develop methods and procedures by means of which he may secure better solutions. It is clear that, once the ends or goals have been shaped, the ascertainment of the developmental levels of the children involved will facilitate the learning and growth processes and make understanding possible.

The placement of materials and activities in the social studies is a highly complex matter, for there are so many factors to be taken into consideration. Among these are the experiential background, includ-

ing informal, or incidental, as well as formal, teaching and learning; the degree of maturity, as measured by chronological age, physiological age, mental age, social age, and similar considerations; the degree of maturity as it exists today, as it obtains under the best known conditions, and as it is affected by the ultimate potentialities involved; the rate and direction of growth; the interests; the needs; the socio-economic status; the degree of motivation; the attitudes; the methods and materials of instruction; the learning procedures; the difficulty of the material and activities to be learned; the objectives; the reading ability; and the modifiability of native ability.

In the past, opinion has played the major rôle in the grade-placement of materials and activities in the social studies. This sort of placement has usually been completely dogmatic, though upon occasion it has been based on an appeal to certain principles, such as (1) going from the specific to the general (from the simple to the complex, from the concrete to the abstract); (2) from the near to the remote (present to past, nearness in space to remoteness); (3) from the past to the present; and (4) from the psychological to the logical. In no instance have these principles been subjected to experimental verification as to their appropriateness in connection with child development, a procedure that certainly must be carried out before they can be accepted as grading principles. For certain materials, notably books, vocabulary ratings have been used to determine grade placement. Some workers have tried to determine needs and interests and still others have used teacher experimentation, but very little grade placement has been made on the basis of accurate research showing the appropriateness of the materials and activities in terms of the maturity of the youngsters. Good summaries of current practice (30, 64) indicate virtually no agreement whatsoever as to the appropriate placement of materials and activities in the social studies. This may mean that there is no optimal placement or it may mean that current practice has much of the inappropriate concealed within itself.

Because of the enormous complexity of the problem the need for a tentative attitude is great. Actually, because of this need, the absence at present of cut and dried solutions may be a good thing. It is entirely possible that desirable grade placement of social-studies material may shift from year to year. Different environments play an important rôle; headline topics are continually shifting. Appropriate sequential arrangement of the materials and activities of the social studies is very difficult; there seems to be no optimal age at which social-studies

subjects as such can be taught (they must be broken up or integrated); and the processes of growth and maturation themselves may be altered. This does not mean that research is valueless; it does mean that it must be continuous, that it must never be thought final. It is of course possible that much of the shiftiness of content would be taken care of if we stressed the development of appropriate skills and methods of thinking and problem-solving. These then could be employed in dealing with any problem, material, or activity in the social studies.

At the present state of our knowledge of placement of materials and activities in the social studies, mastery of research procedures and techniques by means of which placement may be determined in accordance with developmental status is much more important than knowledge of the placement of any specific item that may change on a moment's notice. It is important for teachers to know the factors involved and the methods of research. The lack of definite research dealing with some of the important problems in the field of the social studies renders it imperative that much of what follows be illustrative and suggestive in character. Throughout, stress will be placed on procedures and methods of solving problems rather than on the particular solutions reached to date.

II. CONCEPTS

1. The Nature of the Concepts of Young Children

The concepts of very young children are quite inadequate as judged by adult standards, but they are not qualitatively different from those of adults nor is there any particular point in the development of the child where the possibility of acquiring concepts puts in a first appearance. Evidence is at hand to demonstrate clearly that children reason at an early age and that reasoning continues to develop throughout childhood and on into adolescence (10). Other evidence (23, 24) indicates not only that children reason but also that their thought processes are not qualitatively different from those of adults. A concept such as that of 'triangularity' may be present as early as the fifteenth month (45). As language develops, experience accumulates, and mental age increases, the number and richness of concepts increase correspondingly. The period from nine to fifteen is particularly productive in the acquisition of meanings. Thorndike (67) shows that during the intermediate grades unlimited possibilities for the enrichment of meanings are presented. During adolescence there is steady augmentation of insight, imagination, concentration, problem-solving

behavior, and related mental activities (12) that should make the acquisition and enrichment of concepts particularly easy.

2. Experimental Data

Several good lists of significant objectives in the field of the social studies have been proposed (2, 58, 71, 73). If objective tests were devised on the basis of these objectives and then given to children of different developmental levels following the same method of instruction with each level prior to the testing, we would have just the sort of data this Yearbook is concerned with. Unfortunately, much more research is needed before adequate experimental data of this sort can be had. Some scattered work, however, has been done.

Thus Croxton (13) tested children from kindergarten age through the eighth grade for their ability to generalize and apply the results of special experience. He exposed the children to carefully prepared essential experience in the form of demonstrations or directed play for eight minutes and then tested them for capacity to generalize and apply what they had experienced with no assistance from either the teacher or the experimenter.

His data indicated that many children in the higher primary, the intermediate, and the junior-high-school grades are capable of generalizing, but that junior-high-school pupils are not markedly superior to intermediate-grade pupils in their ability to generalize. Such superiority as there was, manifested itself in more consistently applying the generalizations. The average number of generalizations per pupil on the problem of comparing plants and animals showed a fairly steady increase from the kindergarten through Grade VIII. In the experiment dealing with the concept of the simple pendulum principle, and in that dealing with the concept of warm air rising and cold air sinking, both the percentage generalizing and the percentage applying was markedly less in the eighth grade than in some of the preceding grades. Thus in the case of the simple pendulum principle, Croxton's data are as shown in Table I.

The summary of his four generalizing experiments is shown in Table II.

Croxton's experiments are very interesting in showing that the ability to generalize is definitely present even in the later primary period. His data are not checked against mental age, but there does seem to be considerable growth in generalization with grade advance except in the higher grades. This slump in the higher grades may be

TABLE I — PERCENTAGES OF PUPILS IN SCHOOL GRADES FROM KINDERGARTEN THROUGH GRADE VIII THAT COULD GENERALIZE, OR APPLY, OR BOTH, THE PRINCIPLE OF THE SIMPLE PENDULUM

(From Croxton)

School Grade	No. of Pupils	Percentage That Could:		
		Generalize	Apply	Both Generalize and Apply
Kind.	—	14	11	—
I	—	24	40	—
II	—	27	58	—
III	24	76	76	42
IV	21	48	76	48
V	27	78	52	48
VI	32	84	78	68
VII	20	25	50	20
VIII	22	36	27	27

TABLE II — PERCENTAGES OF PUPILS IN SCHOOL GRADES FROM KINDERGARTEN THROUGH GRADE IX AND IN TWO OPPORTUNITY CLASSES THAT COULD GENERALIZE, OR APPLY, OR BOTH, ON THE BASIS OF FOUR EXPERIMENTS

(From Croxton)

School Grade	No. of Pupils	Percentage That Could:		
		Generalize	Apply	Both Generalize and Apply
Kind.	182	10	14	7
I	188	21	26	5
II	172	43	33	18
III	189	40	43	21
IV	223	57	44	28
V	219	62	53	38
VI	246	61	62	41
VII	85	65	66	51
VIII	77	65	60	55
IX	62	58	66	40
Oppor. I	30	37	33	17
" II	35	69	63	40

caused by an actual slump in the behavior investigated; it may be caused by the nature of the experimental setup; or it may be that the nature of school experience impairs or inhibits this sort of activity.

Only further research will answer the problem. His technique for avoiding the fallacy of verbalism is worthy of considerable use and extension.

Haupt (22) has presented interesting data in the realm of science showing increases in the scope of generalizations with maturity. His procedure and technique should be applied to the social studies.

Lacey (35) studied growth in concept formation in the social studies in 450 children in the first three grades. She found progressive development of understanding from grade to grade, with a greater difference between second and third (critical ratio 7.6) than between first and second (critical ratio 2.6). She found that these children possessed considerable information, but also many misconceptions (see Table III).

TABLE III — PERCENTAGE OF CHILDREN HAVING SOME CORRECT AND SOME INCORRECT CONCEPTS

Field of the Concept	No. Concepts Tested	Grade I		Grade II		Grade III	
		Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Home life	12	74	46	76	36	82	29
Community helpers	12	66	57	71	42	78	39
Food, clothing, and shelter	9	77	35	80	21	87	22
Distant lands, earlier times	9	50	37	62	42	83	27
Animals	9	55	65	62	49	67	42
Insects and birds	9	53	63	55	51	66	38
Trees, plants, and flowers	9	51	52	52	49	67	39
Seasons and weather	4	51	83	58	74	73	65
Great people and special days	9	45	68	43	55	59	50
Great inventions	12	65	33	69	19	81	12
Transportation	12	57	51	64	42	76	34
Citizenship	9	60	61	60	46	70	37
Entire Test		58	54	64	43	74	36

Lacey also pointed out that "the differences within a grade group seem to be of more importance than the differences between grades." Unfortunately, for the purposes of the Yearbook, she did not ascertain whether or not this is correlated with differences in mental ages. She also found that "concepts which involve personal relationships seem

more difficult to teach than mere factual information about objects." This, too, should be checked to see if it is related to developmental level. Another point of considerable import for research in this field is Lacey's finding that "the responses of children in the first three grades to particular meanings associated with a concept show much greater differences than their responses to the concept as a whole. Absurd errors or misconceptions are concealed in the sum total of meanings which make up the general concept." Thus, for example, some children who had certain correct notions of both wild and tame animals, and of the farmer, thought, nevertheless, that all animals, wild or tame, must be cared for by the farmer.

Michell (44), working with fifth-grade pupils, showed that certain concepts, such as 'unemployment,' 'wage earner,' 'labor union,' and 'strike,' were learned by a majority of the class, but that few or none mastered such broad concepts as 'economy of abundance,' 'capitalism,' and 'industrial revolution.' What developmental level is required for the mastery of such concepts and where is the borderline for those that were mastered in the fifth grade?

Mathews (40) tested children from Grade IV through Grade XII for comprehension of various types of curricular materials in the social studies. These materials consisted of dramatic episodes, other reading materials, bar graphs, line graphs and circular graphs, time lines, pictograms, and maps. The reactions of 9,711 pupils in 95 towns and cities ranging in population from 20 to 5,620,048 were secured. Intelligence records were obtained for 4,231 of the 9,711 pupils studied, but the only use made of these data was to conclude that they "tend to show that the sampling of children is quite representative of the public-school population in the United States." Mathews found that the ability to comprehend and interpret the reading and graphic selections he used increased gradually from the fourth to the twelfth grade. Using arbitrary criteria of 50, 67, and 75 percent degrees of comprehension, he indicated grade levels for each of these degrees of comprehension of the materials he studied. Thus, in the case of one of his circular graphs a mastery of 50 percent would call for a 5.4 grade-location, a mastery of 67 percent for a 7.1 grade-location, and a mastery of 75 percent for a 7.4 grade-location. Similarly, Pictogram 4 would call for grade-locations 4.9, 6.8, and 7.0 for the three criteria of mastery, respectively. Mathews found circular graphs easiest, line graphs most difficult, and bar graphs midway between the two. The grade-placements designated on the basis of this research can only

apply where similar experiential backgrounds obtain, for Mathews made no attempt to instruct the children in the proper usage of the curricular materials involved in his test. Really to ascertain placement in terms of maturity, this factor should be included in the experimentation. It would also be a valuable contribution if a study were made similar to Mathews' but with performance checked against mental age.

Meltzer (43), by personal interviews, studied the nature and development of 31 social concepts as held by 333 children in Grades IV to XII, inclusive. Shaffer (60) in a later study showed that Meltzer's results could be obtained by the use of suitable group-testing techniques. Meltzer's scores by grade were as follows:

Grade	V	VI	VII	VIII	IX	X	XII
Mean	27.40	45.59	67.60	78.60	86.00	95.00	158.91
P.E.	± 3.05	± 2.33	± 2.34	± 4.32	± 2.20	± 3.00	± 4.30

The children's grasp of the concepts was found to correlate with other factors as follows:

1. With educational age	+ .80	$\pm .39$
2. With grade	+ .69	$\pm .028$
3. With mental age	+ .58	$\pm .038$
4. With chronological age	+ .55	$\pm .04$
5. With occupational status	+ .36	$\pm .034$
6. With number of words used	+ .31	$\pm .032$

This study does not deal directly with the problem of this Yearbook because the performance of the children was not of the problem-solving, but rather of the free-association, type. This makes the matter of the relative difficulty of the concepts involved occupy an unimportant position, exactly the opposite of our problem. The fact that the correlation with mental age is only +.58 may mean that mental age plays a relatively unimportant rôle or it may mean that this particular measuring technique involved other factors, such as previous experience with the concepts, to a greater extent than it did mental age. Another difficulty from the point of view of the Yearbook is the fact that no effort was made to equate for teaching of the concepts nor was any effort made systematically to instill the concepts involved.

Macomber (38) studied the extent to which high-school juniors and seniors and college freshmen and sophomores of different mental-age levels could gain an understanding of certain economic concepts and problems; namely, those of price (three divisions), money (six di-

visions), and banking (seven divisions). Using the Terman Group Test of Mental Ability, Form B, he classified his high-school students into three groups (Group I, I.Q. 115 plus; Group II, I.Q. 99-114; Group III, I.Q. 76-98). The Group III students had mental ages of 15 years, 9 months, or less. The college students were divided into three groups according to their national percentile standings on the Thurstone Psychological Examinations given at the beginning of their freshman year. Taken as a whole, the concepts proved entirely too difficult for the high-school students of Group III and for large numbers of the high-school students of Group II. The concepts also proved entirely too difficult for college freshmen and sophomores in Group III. The amount of overlapping in the scores between the groups indicates that previous experiences play a considerable rôle in the understandings tested. It also suggests that any attempt to measure the developmental level demanded for mastering given concepts must equate for past experience. The fact that on the majority of the tests the high-school students of Group I made better scores on the pretest than did Group III students on the final test shows either that mental ability plays a crucial rôle or that it is associated with greater experience. Further research in which experience is held constant is required to clarify this point.

The close relation in growth between a particular concept and mental age has been shown by Goodenough (16). She found that the expression of the concept of a man by means of drawing served admirably as a test of mental growth. If other concepts could be scored for degree of completeness present, it is entirely possible that a striking relation between mental age and the development of concepts would be revealed.

Hall (19) attempted grade-placement of high-school texts in the social studies on the basis of pupil understanding rather than on the basis of vocabulary difficulty and diversity. His technique consisted of the presentation of selected typical passages from the book to be rated. These were submitted to 300 pupils in the ninth, eleventh, and twelfth grades of several Los Angeles high schools. Wherever half the class showed comprehension, he deemed that sufficient to warrant using the text at that grade level.

Hall made no effort to use the same instructional procedures at various grade levels in developing understanding of the concepts he was dealing with. Consequently his study furnishes no data on optimal grade-placement in terms of the various factors in child development.

Repetition of his work with this added objective would be of considerable value.

Some thinkers in the field of the social studies are coming to the belief that the chief factor governing placement of social-studies materials should be the reading rate and comprehension. Reading ability is undoubtedly an important factor and its relationship to other factors in the problem of child development and the social studies should be thoroughly investigated.¹

Burton (11) made an extensive investigation of children's civic information and found that their socio-economic status played a large rôle in achievement. He also found that certain concepts were acquired mainly within the school, others chiefly outside the school. Thus the concept 'divorce' was acquired outside the school while such a concept as 'legislature' was learned within the school. Burton showed that where direct instruction was given, learning occurred much earlier and much more widely than where incidental learning was relied upon. He concluded that "pupil interest and maturity are such as to permit and demand the earlier introduction of direct civic instruction."

3. Misconceptions

The fact that social-studies concepts are often inadequately grasped from the adult point of view and that many misconceptions exist has been abundantly demonstrated (4, 18, 28, 43, 53, 59, 62).

a. Typical Misconceptions. By means of stenographic reports Kerr (33) traced many misconceptions to erroneous statements made by the teacher or to uncorrected wrong statements made by pupils.

Scott and Myers (59) showed that 'perfect' recitations and correct answers are often made in spite of the fact that children have only vague or even incorrect notions of some of the terms they frequently use. Similarly Aitchison (1) showed that serious misconceptions relative to the meanings of 'torrid,' 'temperate,' and 'frigid' zones were present in the sixth, seventh, and eighth grades. Errors were also found among college students, only 27 percent of whom selected the correct answer in a multiple-choice test.

Ayer (4) tested fifth- and seventh-grade pupils on reading materials from history textbooks and found that the children were unable to comprehend what was expected of them. Hall (19) found that, in

¹ For a full discussion of the reading problem the reader is referred to Chapter IX and also to the *Thirty-Sixth Yearbook, Part I*, of this Society.

an eleventh-grade civics class in one of the Los Angeles high schools where the average I.Q. was 106, only 30 percent had even a working grasp of such words as 'political democracy,' 'industrial democracy,' 'constituency,' 'republic,' 'federal,' 'sovereignty,' and 'parliamentary,' although they were trying to discuss such topics as 'responsible government' and 'the control of public opinion in a democracy.'

Mahan (39) showed that students' concepts of the 'characteristics of good citizenship' and the concepts of representative adult citizens may differ very definitely.

These studies, unfortunately, shed no light on the relation to developmental level, though they do show that incidental instruction and formal instruction as usually employed do not meet the need. Optimal grade-placements were not ascertained, nor were the concepts related to mental age.

b. Pupils' Concepts of Time. Several studies of special concepts have been made. Thus, Fuller, Wesley, and Harrison have all made studies of time concepts. Fuller (15) found that "pupils of both the ninth and the twelfth grades have but very little idea of either the sequence or the duration of the greatest events and movements in United States history, and cannot associate great men with significant movements in the period in which they lived, or contemporaneous movements with each other." Harrison (21) studied the nature and development of concepts of 'time' among young children. She tried to show the age (though not the mental age) at which the concept of time is definitely learned. Wesley (73) showed that the child of three has little understanding of temporal relations, but that these concepts grow until college age. He remarks: "Time phrases of a general nature are interpreted loosely. The teacher who uses them should therefore realize that he is conveying only widely varying approximations of time."

c. Pupils' Concepts of Direction. Jersild (31) studied sense of direction in children eight to twelve years old by asking them to choose east, west, north, south, or I don't know, in response to questions such as, "The sun rises in —, the sun sets in —, the moon rises in —, the moon sets in —, New York to New Jersey is —, up the Hudson River is —, to the Rocky Mountains is —." In each case the percentage choosing the correct answer was greater at age twelve than at age eight, but in only one case did the percentage increase for each succeeding age; namely, to the question: "To the Rocky Mountains is

—,” the percentages for ages 8, 9, 10, 11, and 12 were 10, 34, 53, 59, and 70, respectively. Mental-age data are not available, but the combined percentages correct for private-school children (average I.Q. 125), bright public-school children (average I.Q. 144), and dull public-school children (average I.Q. 86) are 65, 67, and 28, respectively.

d. Educational Implications. It would be a serious mistake to conclude from the foregoing studies of misconceptions that mere waiting or postponement will guarantee sudden later emergence of correct concepts. Such is most certainly not the case, for correctness is always relative, never absolute, and only continual, careful, appropriate enrichment of the experiential background will insure steady growth and development of concepts. On the other hand, these studies have clearly shown that it is a serious error to take for granted the presence of complete and accurate concepts. The true status of the concepts of a child must be ascertained and dealt with fittingly if optimal growth is to be assured.

4. General Conclusions as to Our Knowledge of Children's Concepts

In no investigation have attempts been made to teach the concepts studied by identical methods and time allotments over a span of several grades in order to ascertain clearly at what level the desired degree of mastery occurs. Indeed, the problem of the developmental level needed for understanding of a particular concept, or particular aspect of a concept, has hardly been touched upon. Most of the procedures have failed to make allowance for growth of the concepts studied in individual children. In fact, the studies reviewed here (and this applies equally well to the discussion of vocabulary that follows) have assumed a given specific meaning for the concepts dealt with and have paid little or no attention to context or shades of meaning. This tends to make for an ‘all-or-none’ point of view that is at serious variance with the experimental work, which shows that there is a steady growth of concepts and which belies the common assumption that there are no degrees of learnability in the social studies. The situation, therefore, calls for further experimentation in which the problem is attacked from the point of view of the varying degrees of completeness of the concepts present at various developmental levels. Furthermore, in no instance have the mental tests used to ascertain level of maturity been given more than once, though it is quite conceivable that work with the concepts studied may have altered the mental-test score.

Some of the studies have also clearly indicated that at certain levels

of development many concepts are not effectively grasped. Certain significant curricular implications of the prevalence of misconceptions should be mentioned.

1. Reliance on incidental, accidental, and unplanned training (also on some forms of planned training) to develop concepts is not justified.
2. Adult standards must not be applied in testing for the presence or absence of concepts in children.
3. Readiness tests for all concepts involved in the social studies should be devised and utilized.
4. The experiential background without which concepts are meaningless must be systematically supplied.
5. Attempts should be made to ascertain whether or not the concepts to be presented are within the maturity level of the child.
6. If research reveals that the concepts in question are beyond the maturity level of the child, they must be postponed or at least not used as an immediate foundation for further development.
7. If the concepts that at present are inadequately or erroneously grasped are experimentally found to be within the maturity level of the child, effective new teaching and learning procedures must be developed.
8. Attempts to force the child to learn concepts that are beyond his grasp put a premium upon rote memory to the sacrifice of understanding.

III. VOCABULARY

Distinguishing vocabulary from concepts as a factor conditioning success in the social studies is difficult, if not futile. Actually insofar as the words have meanings, we may think of them as representing concepts. The sole justification for making the distinction here is one of convenience in the presenting of data; no qualitative difference is intended.

1. The Investigation by Pressey and Pressey

Pressey and Pressey (51), following a careful and elaborate process, formulated a minimal vocabulary of 384 words, or concepts, in American history. Later Pressey (50) administered an improved list to a large number of pupils in Grades IV, VI, VIII, X, and XII in thirty-one different communities in this country. The results were tabulated in the form of percent correct for each grade. Analysis of Pressey's data indicates clearly that some of the words were too easy,

some were too hard, and some showed definite developmental trends. Thus 'creed,' 'heresy,' and 'propaganda' were among the best of the terms insofar as the developmental trends were concerned. 'Freedom' was too easy in all grades studied, while 'voyage' and 'agriculture' were too easy in all grades other than the fourth. Terms such as 'exploit,' 'unconstitutional,' and 'military occupation' proved too difficult at all grade levels. In some instances interesting reversals took place. Thus 'inflation' was correctly answered by 33 percent of the fourth grade, 34 percent of the sixth grade, 38 percent of the eighth grade, 38 percent of the tenth grade, but by only 25 percent of the twelfth grade. 'Progressive' was answered correctly by 15 percent of the fourth grade, 23 percent of the sixth grade, 16 percent of the eighth grade, 23 percent of the tenth grade, and 41 percent of the twelfth grade. This study did not present data on mental-age levels, but it did cover a large number of places and individuals and classes, so that the trends shown probably represent, at least roughly, group developmental trends. It should be noted incidentally that at each level some children answered some of the questions correctly. It would be very interesting to know if these particular children answered a large percentage of the questions correctly and also to have their mental ages.

2. The Investigation by Kelty and Moore

The results of the Pressey study indicate performance only in the particular context in which the questions were given. Thus it is interesting to compare certain of the results secured by Kelty and Moore (32) and by Wesley (73) with those secured by Pressey.

Pressey presents a table showing at what grades certain terms are mastered, but her grade-placement list, in view of the data in Table IV, must be used with great caution. Kelty and Moore (32), in constructing their objective examinations, offered five choices. One of these, the correct one, was based on a dictionary definition; a second, nearly correct, was supplied by the experimenters; the other three were secured from incorrect responses actually made by the children. It would be interesting to have a test based entirely on preliminary responses, and in which both the correct and the incorrect responses were derived from the actual responses of the children.

Probably research in this field should include many tests of the same word. If these tests are arranged in order of difficulty, on the basis of actual experience, and then checked against various measures

TABLE IV.—COMPARISON OF RESULTS OF PRESSEY WITH THOSE OF KELTY AND MOORE ON KNOWLEDGE OF CERTAIN CONCEPTS IN VARIOUS SCHOOL GRADES

Word or Concept	Experimenter	School Grade								
		4	5	6	7	8	9	10	11	12
Legislation	Pressey	28	—	41	—	72	—	79	—	87
	Kelty-Moore	15	24	15	18	26	23	—	—	—
Unanimous	Pressey	75	—	82	—	85	—	90	—	90
	Kelty-Moore	12	19	13	23	34	41	—	—	—
Impeachment	Pressey	18	—	29	—	60	—	87	—	96
	Kelty-Moore	13	15	10	18	46	38	—	—	—
Mob	Pressey	66	—	75	—	92	—	92	—	97
	Kelty-Moore	14	25	37	52	64	55	—	—	—
Native	Pressey	43	—	65	—	81	—	90	—	96
	Kelty-Moore	11	23	36	65	67	57	—	—	—
Injunction	Pressey	7	—	19	—	42	—	55	—	69
	Wesley	—	—	—	5	12	37	46	59	88
Emancipate	Pressey	22	—	25	—	59	—	69	—	86
	Wesley	—	—	—	25	26	48	67	62	74

of developmental growth, it seems very likely that valuable data may be secured. Such data would be of value to teachers, textbook-writers, and all others interested in the placement of social-studies materials and activities.

3. The Los Angeles Study of Grade-Placement of Reading Materials

The Los Angeles City School District (37) has published a coöperative evaluation of more than 2,700 titles of which some 700 are in the field of the social studies. Grade-placement is based on difficulty and diversity of vocabulary presented. The range of grades in which the social-studies books have been located by this method is from Grade 1 to Grade 15.8. The vocabulary difficulty was determined by the Lewellenz formula, which is said to give results comparable to those secured by standardized reading tests. A comparable technique was used to ascertain vocabulary diversity, which is a measure of the range of the words used without respect to their technical difficulty. These procedures, in themselves, and particularly if coupled with a technique such as that developed by Hall (19), may prove of value to teachers in adapting the social-studies reading materials to the needs and maturity levels of the child.¹

¹ An additional complicating factor evidently exists whenever the difficulty of a textbook or other reading material is measured by inspection or even by testing its

IV. ACTIVITIES AND SKILLS

1. Activities Used and Preferred

Several good lists of skills and activities that should be acquired in the field of the social studies are available (9, 52, 58, 65, 71). These furnish an excellent starting point for a comprehensive program of evaluation, both from the point of view of achievement and the point of view of optimal grade-placement.

Price (52) in an unpublished doctor's dissertation made a critical study of the effectiveness of fifty-two pupil activities in the social studies as judged by 900 teachers in Grades IV through XII and 2,950 students in Grades VII through XII. The teachers were selected as superior by experts in the social studies and were distributed over the United States. The teachers selected as essential the activities of reading to understand, listening to oral presentation in the classroom, engaging in group discussion, reciting in class, reading to locate information, consulting charts and diagrams and maps to locate specific items of information, and giving a special report, or floor talk. With few exceptions these eight activities were rated as the most important and also as the ones most used at all grade levels and in all social-studies subjects. Thus the activities that were reported as most frequently used by the teachers and also as most important are the activities that require the gathering of information from numerous sources, such as textbooks, maps, graphs, tables, and the like, and the recitation and discussion in the classroom of the facts gathered.

As might be expected, the students in general rated as helpful the activities their teachers had rated as essential. However, when the students were asked to rate the activities on the basis of liking, quite different ratings were secured. The activities rated as most liked by the students are those that involve a greater element of direct experience and also a greater element of creative activity. Price points out that this raises a vital question as to the validity of the commonly used teaching procedures, especially in view of the doctrine of interest and the increasing emphasis being placed upon creative expression and direct experience. It would seem that teachers place too much em-

vocabulary as such, because it is entirely possible that a term intrinsically difficult may be so introduced in the text (by appositives, synonyms, definitions, and illustrations) as to become readily grasped by the reader. It may be added that the validity of the Lewerenz formula has seemed dubious to some who have tried to use it.—*Editor.*

phasis upon the printed word and too little on such other activities as listening to the radio, listening to illustrated lectures, observing drama, and similar activities.

Students of low ability, as indicated by intelligence quotients, ranked higher most of those activities involving more careful and meticulous study and those activities involving more concrete experience, such as looking at pictures and dramatization. Students of higher ability preferred those activities involving rapid skimming, organization, and planning.

Price found considerable sex differences in the ratings he secured:

Among those activities rated as more helpful by boys than by girls we find observing pictures and maps to locate information; listening to radio programs, oral presentation and motion pictures; engaging in group discussions, mock trials, and debates; giving floor talks; reading for enjoyment; drawing pictures and cartoons, diagrams, graphs, charts or tables, and plans; preparing exhibits and constructing models; and taking new type examinations. In contrast to those activities rated higher by boys as helpful are those which were rated higher by girls. In general girls preferred committee work, drawing maps, writing themes, plays, and summaries, reciting and reading aloud, listening to illustrated lectures, reading to understand and to memorize, and studying graphs and statistical tables.

The ratings of teachers, which are to some extent reflected in the ratings of students, generally tend to place in the position of greatest importance those activities which are traditional in nature, which emphasize acquisition and recitation of information in the classroom, and which minimize the use of information gathered in new situations.

Barker (5), in an unpublished master's thesis, tested children in the kindergarten and Grades I, II, and III for their knowledge of various activities. In general her tests showed a steady gradual increase in the recognition of the activities from grade to grade. "Children acquire more information on home and community life and occupational activities between the levels of kindergarten and Grade II. Between Grades II and III they expand their knowledge of nature activities in other lands, recreation, citizenship, and history." She also found that reading age is not a satisfactory indicator of social information in children, because children may read with a mastery of the mechanics satisfactory to the teacher and still have a poor knowledge of social activities. Moreover, children may have a wide back-

ground of social knowledge and be poor readers, which implies that the rôle of informal education in the acquiring of social information is great.

2. Experimental Investigations of Skills Essential in the Social Studies

Howe (29) studied the ability of elementary-school pupils to read maps. He worked with children in the fourth, fifth, and sixth grades and concluded that children's concepts in map work are inexact and obscure.

Thorp (68) studied the ability of pupils in Grades IV to VIII to use geographic tools. Five hundred fifty-six pupils ranging in age from nine to fourteen and located in rural-consolidated, village, small-city, and large-city schools were studied. The grade range was from four to eight. The results of the experiment showed that "incidental teaching of correct usage of geography tools has failed." If, however, systematic efforts are made to teach the use of the various tools, the "work is easily within the comprehension of the average sixth grade." Unfortunately the systematic attempts to instruct were confined to the sixth grade. Thorp worked out a suggested grade-placement of geography tools on a threefold basis: (1) for incidental instruction, (2) for teaching usage, and (3) for drilling in usage.¹

Thomas (66) studied the ability of children to interpret graphs. She experimented with 355 children in Grades IV to VII. In each grade the children were divided into slow, average, and superior groups. The two-dimension diagram, the pictorial graph, and the circle graph proved easier than reading rank from the line graph. Indeed, she found only eight pupils in the seventh grade who were able to read rank from the line graph. Among her other conclusions are the following:

Slow fourth-grade children understand little of the meaning of graphs; superior fourth-grade children understand the meaning of simple graphs and can read simple facts from them. Above the fourth grade, children can read graphs of simple types if the graphs are adapted to their attainments in the tool subjects. Picture graphs, two-dimension diagrams, and circle graphs are the easiest for pupils of all grades to read. Line graphs are the most difficult for children at all levels tested. With proper instruction and explanation, children in the seventh grade can interpret all simple graphs.

¹ For Miss Thorp's table, see "The Teaching of Geography." *Thirty-Second Yearbook of this Society*, 1933, p. 506.

In this experiment the same tests were given at all of the grade levels tested, but identical systematic instruction was not given at all levels, nor were the results checked with mental age for optimal placement in terms of mental ability.

Wrightstone (75), in a summary of an as yet unpublished study, has raised the question, "Which form, the conventional graph or pictorial statistics, is more effective in presenting identical quantitative social data when the efficacy is judged by (1) accuracy in locating specific facts or information; (2) accuracy in interpreting or synthesizing facts and trends; (3) immediate recall and recognition of facts; and (4) delayed recall and recognition of facts." He used eighteen pictorial graphs illustrating statistical treatment of facts and data from science and social science. His subjects, 820 pupils from Grades VII to XII, were treated in two groups equated in chronological age, education, and social status. According to the evidence he secured, the pictorial statistics were more effective in helping pupils to locate specific facts and information than were the more usual bar, circle, and line graphs—average scores 29.40 for pictorial statistics and 27.36 for the regular graphs, a significant difference. For the purposes of interpreting facts and trends and also for immediately recalling facts that had been presented, neither the pictorial statistics nor the regular graphic medium was superior. In the delayed recall of facts, tested 24 hours after the material had been presented to the pupils in pictorial statistics and in regular graphic form, the memory of facts gained through pictorial statistics was superior to that gained through the conventional graphs.

The Committee of Seven of the Northern Illinois Conference on Supervision (72), as noted in the preceding chapter, placed the optimal mental age for learning simple bar graphs at 10 years, 5 months.

Wrightstone (76), in an unpublished study,¹ investigated in Grades VII to XII growth in the social-studies skills of reading maps and graphs and locating references. He raised the following questions: (1) How does growth in these defined social-studies skills progress by grades? (2) How does it progress by mental age? (3) How does it progress by chronological age? (4) What are the intercorrelations between the various factors and skills in interpreting the materials used?

¹ The account that follows of the findings in this study is based on material that Mr Wrightstone, of the Bureau of Educational Research of Ohio State University, kindly submitted for use in this Yearbook. To Mrs. Wrightstone we are indebted for drawing the accompanying charts.

The procedure in treating the data for growth curves adopted by Wrightstone was that of using the mean performance of the lowest group as the origin, or zero point. Then the standard deviation in test results of the group thus used as a base was designated as the unit of measurement. The mean test performance of Grade VII was used as the origin, or zero point, and the standard deviation of Grade VII was designated as the unit of measurement, for example, in Figure 1.

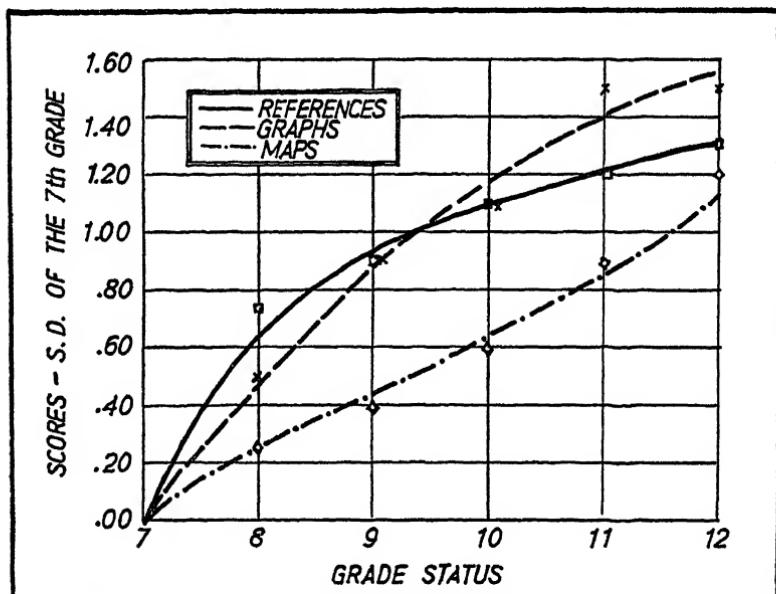


FIGURE 1.—GROWTH FROM GRADES VII THROUGH XII IN SKILLS IN READING GRAPHS AND MAPS AND KNOWING REFERENCES (Wrightstone)

With respect to the results obtained, the following is quoted from Wrightstone's account.

From the data in Figure 1 several tentative conclusions may be drawn.

1. In the selected social-studies skills investigated a gradual growth occurs from Grade VII through Grade XII.
2. It seems that the growth curve on references has definitely reached a point of inflection at the eighth grade and that the shape of the growth curve on graphs indicates either that it has already passed the point of inflection where the study began at the seventh grade (and this would coincide with other information on graphs) or that the point of inflection is reached at Grade IX.

3. Differences in growth for the curve of map-reading compared with the curves for references and graphs indicate either differences in curricular opportunities or fundamental differences in the psychological skills or abilities involved.

4. In this investigation map-reading seems most difficult at all grade levels; knowing references is of intermediate difficulty; and graph-reading seems to show the most consistent and rapid growth.

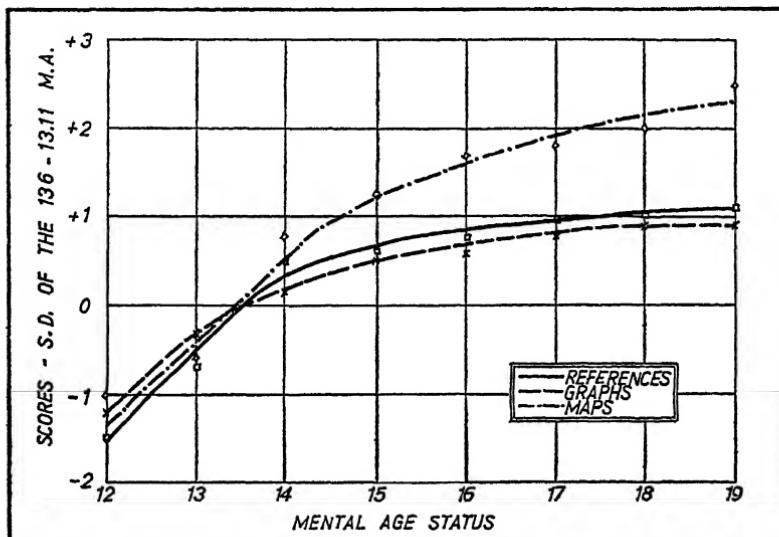


FIGURE 2 — GROWTH ON THE BASIS OF A MENTAL-AGE INDEX IN SKILLS OF READING GRAPHS AND MAPS AND KNOWING REFERENCES (Wrightstone)

The implications of these findings for the grade-placement of social-studies materials are: (1) Even comparatively simple exercises in map-reading, graph-reading, and knowing references, such as those comprising the test used in this investigation, may be used through the twelfth grade with the expectation of increased pupil growth and comprehension; and (2) incidental observation of instruction on the social-studies skills of this investigation leads to the hypothesis that more systematic instruction would accelerate the achievement at each grade level over the present grade achievement.

Grade, as a concept in educational research, however, is variable from community to community and is particularly affected by policies of promotion. A grade includes pupils representing more or less wide ranges of scholastic aptitude, chronological age, and interests in and experiences with the curricular materials. Growth in the selected social-

studies skills was studied on the bases of scholastic aptitude and chronological age.

To study growth on the basis of a mental-age index test, data on the selected social-studies skills were tabulated according to half-year intervals. This index was obtained by multiplying the chronological age by the I.Q. of each pupil. The mean test performance of the 13-6 to 13-11 mental-age group was used as the origin, or zero point, and the standard deviation of the same group was designated as the standard unit of measurement. In Figure 2 rates of growth are described by mental-age categories for skills of reading graphs and maps and knowing where to look for items of information in references.

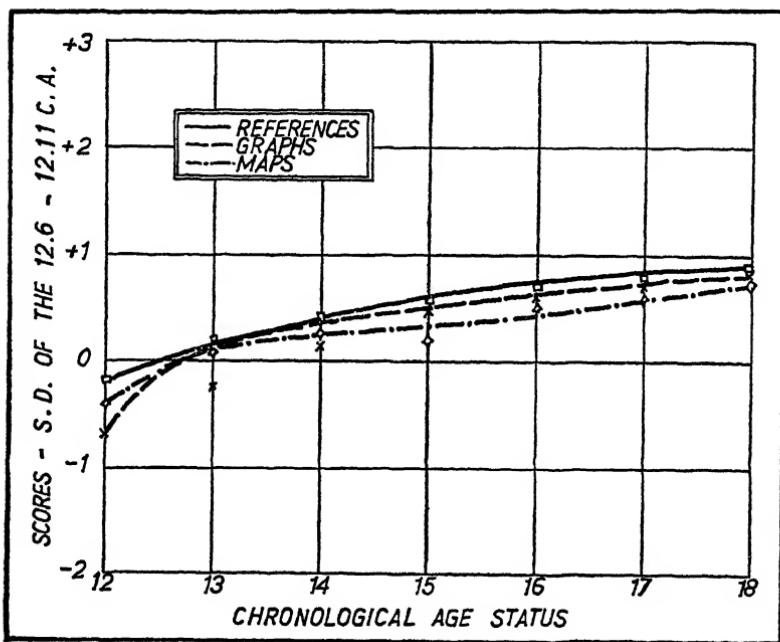


FIGURE 3.—GROWTH ON THE BASIS OF CHRONOLOGICAL AGE IN SKILLS OF READING GRAPHS AND MAPS AND KNOWING REFERENCES

From the data charted in Figure 2 several conclusions may be drawn.

1. All the selected social-studies skills show a steep acceleration in growth to mental age 14; thereafter the acceleration is more gradual.
2. After mental age 14, the curve for knowing references accelerates only slightly, and the curve for reading maps has relatively the most acceleration.

The implications of these findings for the grade-placement of social-

studies material are: (1) For pupils in any grade who have a mental age of 14, and especially through Grade VIII, the acquisition of the selected social-studies skills is very rapid; (2) the difficulty of curricular experiences in these skills should be suited to the individual's abilities and needs; (3) the higher the mental-age status of a pupil, the more complete probably is his mastery of the selected social-studies skills; and (4) postponement of all three topics to a mental age of 14 is desirable and there is much to be gained by postponing the maps to a mental age of about 16.

To analyze growth on the basis of chronological age, test data were tabulated according to half-year intervals for chronological age. The mean test performance of the 12-6 to 12-11 year-olds was used as the origin, or zero point, and the standard deviation of the same group was used as the standard unit of measurement. In Figure 3 rates of growth thus obtained are shown graphically for reading graphs and maps and knowing where to look for items of information in references.

The data in Figure 3 indicate a fairly steep acceleration in growth in the selected social-studies skills to the age of 13. After the age of 13, however, in all the selected skills the curves accelerate only slightly. The curves for all skills tend to lie close together with only slight deviations. The implications of these findings for grade-placement are: (1) To the age of 13 (the average for Grade VIII) the process of growing older seems to have some relationship with the development of skills in reading maps and graphs and finding information in references; but (2) after the age of 13 the process of growing older seems to have little direct relationship with acquiring the selected social-studies skills. (One rather obvious reason for the difference in shape of the chronological-age curve and the other two is that dull, over-age children would naturally tend to reduce the achievement of the upper chronological-age group.)

TABLE V — INTERCORRELATIONS OF CHRONOLOGICAL AGE, MENTAL AGE, AND SELECTED SOCIAL-STUDIES SKILLS

	Chronological Age	Mental Age	Reading Maps	Reading Graphs
Reading Maps	.2303	.2204	—	—
Reading Graphs	.2613	.4927	.6275	—
References	.1747	.0789	.3670	.4635

In order to investigate the relation between factors of chronological age, mental age, and the selected social-studies skills, coefficients of correlation were computed. These correlations are presented in Table V.

The coefficients of correlation are uniformly low and positive between chronological age and the selected social-studies skills, averaging about .22. Mental age has low positive correlations with reading maps and finding references, but correlates .49 with reading graphs. Reading maps and reading graphs have certain common factors, as is indicated by the correlation of .63. Reading maps and reading graphs correlate .37 and .46, respectively, with finding references. Certainly, many other factors besides chronological age and mental age operate to influence the acquisition of selected social-studies skills.

In summary: Assuming social-studies materials of the type and difficulty used in this study and recognizing that our findings derive from present instructional practices, the following answers may be given for the questions investigated.

1. In reading of graphs and maps a gradual growth continues from Grade VII through XII.

2. At all grade levels such comparatively simple exercises as those comprising the test may be used with the expectation of increased pupil growth and comprehension.

3. For pupils in any grade who have a mental age of 14, and especially through Grade VIII, the acquisition of selected social-studies skills is very rapid and the rate of acquisition decreases proportionately thereafter.

4. Up to the chronological age of 13 (the average for Grade VIII), but only slightly thereafter, the processes of growing older seem to have some relation to the development of skills in reading maps and graphs and finding information in references.

5. Intercorrelations of various factors, chronological age and mental age, with the selected social-studies skills are positive but low, averaging about .22, except for mental age and reading graphs, which is .49. Certainly many factors operate in the determination of grade-placement of materials to develop social-studies skills, but the findings of this study should provide some additional guidance to the social-studies teacher about various aspects of growth in the skills investigated.

Shaffer (61) studied the ability of pupils in Grades IV to XII to interpret cartoons. His curves show that there is a marked improvement between the ages of twelve and fifteen, that the types of error and the processes of reasoning used are similar to those in reading, and that abstract interpretation of cartoons can be made by junior-high-school pupils.

Hopps (27) found that pupils of the fourth, fifth, and sixth grades have very poor abilities in reading pictures for geographic purposes.

Hollingworth (26) showed that gifted children (children with I.Q.'s

ranging from 130 to 200) from 9 to 11 years of age can use the card indexes and other facilities of the public library.

Bassett (6) raised the question, "What are the factors determining retention of historical knowledge?" She reported that the combination of interest and effort was the most important of the factors studied. The highest multiple correlation was yielded by interest and effort, mental age, subject preference, and scores on the Pressey-Richards test.

Melbo (42) investigated the influence exerted by the amount of social-studies instruction upon stock of information on contemporary problems. He studied 4,348 returns from 39 California public high schools and found the correlations between the amount of information on contemporary problems and issues and the amount of social-studies instruction to indicate an almost complete lack of relationship. The r 's ranged from $+.26 \pm .04$ to $-.13 \pm .04$. In a number of instances the P.E. of the r equaled or exceeded r . Expressed in other terms, students who had had ten or more semesters of social-studies instruction during their four years of high school were no more likely to have information on contemporary problems and issues than were those students who had had only one or two semesters.

3. Conclusions with Respect to the Investigations of Skills

In the realm of skills and activities grade-placement on the basis of crucial experimentation (using the same teaching procedures at various grade levels and then checking against the various factors in child development to ascertain optimal placement) is not available. The need for definitive research of this sort is great and must be forthcoming before we can make much progress in the field. Where studies covering several grades have been made, the pupils have been taken as they are and the effect of any differences in informal and formal instruction has not been properly allowed for. Where attempts at instruction have been made, they have been made at one grade level only. Such results as are available tend to indicate that if systematic instruction is employed, many skills and activities can be introduced much earlier than if matters are left to incidental development. This would seem to indicate that the true rôle of maturity here is as yet unknown.

The fact that certain forms of achievement are virtually unrelated to the number of social-studies courses taken indicates that the rate of incidental or informal learning is great. This may be because virtually nothing is achieved in the social-studies courses or it may be because the relative proportions so greatly favor the informal instruction. If

the latter, then we must attempt to control the informal agencies of instruction as well as to improve the formal modes of instruction.

V. ATTITUDES

1. Underlying Psychological Mechanisms

According to a recent résumé by Prescott (49), quoted here with slight modifications:

Attitudes are physiologically rooted, but they also represent the highest form of mental organization—generalization based on experience. Specific attitudes often show that a particular experience has had either a desirable or an unfortunate result for the individual. A still higher form of mental organization is the generalized attitude, which crystallizes gradually from a whole series of experiences. Next in the hierarchy of attitudes come attitudes of loyalty. Then comes another higher mental organization of attitudes, attitudes arising from abstract value concepts. The final level of mental organization, the ultimate in attitudes for a particular person, may be called his purpose—'what he wants to get out of life.' Life may be lived for material ends; life may be lived for the social good; [or life may be motivated by] abstract concepts of good or beauty. . . . self-interest ranging from the grossest selfishness to the most enlightened altruism mediates the development of attitudes and determines their orientation. Accumulated experience ingrains them more deeply and causes them to become, in turn, the directing agents of personality development and expression.

Allport has summarized the psychological process involved by pointing out that attitudes are built up by the accretion of experience (integration), by individuation or differentiation, by dramatic experience or trauma, or that they may be accepted ready-made.

2. Studies of Attitudes

The study of developmental levels in the realm of attitudes is particularly precarious, for investigators have shown that attitudes may be readily changed and that the rôle of trauma or accident is great. Thus Peterson and Thurstone (47) furnished experimental evidence of the rôle motion pictures have played in the influencing of attitudes of children. Hockett (25) concluded that the greatest changes in attitudes occur when the teacher is conscious of the problem of attitude. Bateman and Remmers (8) have shown a pronounced shift in pupil attitudes toward social topics after studying social insurance, capital punishment, and labor unions. Hadley (17) has shown that the presen-

tation of a relatively small amount of social stimulus material may produce a marked shift, and McConnell (41) has shown that attitudes toward certain proposed social acts may be definitely affected by defined educational content.¹ Remmers (56) has shown a significant shift toward a more favorable attitude toward the League of Nations after a short lecture on the subject. Tyler (70), on the other hand, has shown that there is a strong tendency for generalized attitudes to stay put.

The Virginia State Board of Education has made a list of attitudes that might well serve as a point of departure for some important research in the social-studies field (71). This list, together with the techniques of Thurstone and Remmers for measuring attitudes, should prove of great aid to teachers and research workers in the field of the social studies. This is particularly true of the generalized-attitude scales developed by Remmers (54, 55) and his co-workers.

A study by Peterson (48) tended to show that children's attitudes are much like their parents' attitudes. He compared attitudes on government ownership of railroads, the New Deal, control of liquor sales in Indiana, C.C.C., attending motion pictures, A.A.A., old-age pensions, township trustees, the Negro, and the high school. He found "all correlations between parents and children to be positive" (actually the range was from $-.047 \pm .084$ to $+.760 \pm .038$, with an average r of $+.362$), and found evidence that children's measured attitudes were like the parents' attitudes. He even concluded that "since sons and daughters are the most liberal of all the groups, with mothers second, and fathers most conservative, it may be safe to conclude that mothers are more affected by the children's attitudes than are children by the mother's." Anderson (3), in a study at Minnesota, found that students' attitudes on matters of religion were like those of the parents, whereas on matters like the Spanish Civil War their attitudes were not like those of their parents but were determined more by their associates.

The problem of comparative social attitudes at the senior-high-school level was studied by Smith (63). Attitudes toward industry, the state, the church and personal morality, the family, and the school were studied in 1,126 high-school seniors representing four urban, four town, and eight rural high-school districts in California. The attitudes

¹ Impressive evidence on the production of mass attitudes by systematic educational propaganda lies at hand in the European countries — if not in our own — at this moment. — *Editor.*

of these seniors were compared with those of 286 of their parents and 192 of their teachers.

Smith reached the conclusion:

There is little evidence . . . that the social-studies instruction in our schools is succeeding in developing in our California high-school seniors attitudes and intelligent opinions toward issues basic to citizenship and social betterment beyond those which the seniors share with their parents as a group. . . . The implication seems clear that if the schools are to promote and develop social attitudes in harmony with those held by persons best informed on social questions, cognizance must be taken of parental attitudes. There is strongly indicated a need for the development of coördinated classes for parents with their children to study and to discuss public affairs under the guidance of the schools in order that there may eventuate intelligent opinions and unbiased attitudes toward significant social problems.

The correlations found by Smith follow:

The dependence of seniors on parents	61
The dependence of seniors on high-school teachers ..	.12
The dependence of seniors on university professors .	.01
The multiple correlation coefficient92

Bateman (7), in a study on the relation of attitudes toward school subjects and certain other variables, found that fourteen-year-old students have the best attitude toward algebra and Latin, while seventeen-year-old students have the best average attitude toward English. The sixteen-year-old group has the best attitude toward history. Grade XII has the best average attitude toward English and is tied with Grade X for the best history attitude. Grade XI likes algebra best. A significant difference was found between the attitudes of Grade IX and Grade XII in the matter of history, Grade XII being definitely more favorable.

Peters and Peters (46) studied children's attitudes toward law as influenced by participation in student self-government. The purpose of the study was to determine experimentally whether pupil self-government has any influence upon the attitudes of elementary-school children toward obedience to law. Pupils in Grades VI, VII, and VIII of two Indiana schools were presented with concrete situations gleaned from the records of actual cases on file in the office of the district attorney of Lafayette, Indiana. The children in the two schools were drawn from practically the same social and economic background.

The one school had a rather elaborate system of student self-government; the other did not have any system of self-government. The Otis Self-Administering Test of Mental Abilities, intermediate examination, Form A, was administered to both groups, as was also the Remmers-Kelley Scale for Measuring Attitudes toward Any Institution. This latter attitude scale was also administered to the parents of Group I. The correlation between intelligence scores and scores on attitudes toward law was $+.001, \pm .04$. The pupils under the influence of self-government showed a much more favorable attitude toward law observance than did those not having student self-government. The value of the critical ratio was 9.76. The inter-grade comparison showed that as children grow older they become less conforming to pressure imposed by law. The relation between the attitude of the pupil and the attitude of the parents toward student self-government yielded a correlation of $+.98, \pm .004$.

Wrightstone (74) studied the relation between attitudes toward race, international affairs, national politics, national achievements, and other factors in 412 pupils, in Grades IX to XII. He found a negligible correlation between civic beliefs and intelligence and between civic beliefs and emotional stability. The number of social-studies courses completed was no guarantee of changed attitudes. A positive correlation was found between volume of current reading and liberal beliefs. Girls were considerably more conservative than boys.

Kornhauser (34) studied changes in information and attitudes of students in an economics course. He found that the changes in attitudes bore no clear relation to their intelligence or to their economic knowledge as gained in the course.

Rosander (57) correlated intelligence, personality scores, and information about the Constitution, with attitudes toward the latter document, finding a small positive relation between introversion and critical-mindedness and almost none between critical information and attitudes. He also found a small change in attitudes caused by a twelve weeks' course on the Constitution.

Jersild (31) studied children's information and opinions in New York public-school children of ages 8 to 12, none of whom were above the sixth grade. He found that the percentage of children who would go to war if people in a foreign country "spit on our flag and stamped it in the mud" reached a peak at age 10 in the case of Mexico, at age 8 in the case of Germany, and at age 10 for the "other" country. The lowest percentage was at age 8 for Mexico and Germany, whereas the

percentage was approximately the same for ages 8, 11, and 12 in the case of the "other" country. He found in reply to his question as to whether or not we should go to war if people of our country traveling in another country were killed, the highest percentage answering *yes* at age 8 and the lowest at age 12. In reply to the question as to whether or not we should go to war if the Japanese sank one of our battleships, he found that the greatest percentage answering *yes* occurred at ages 11 and 12, the lowest at age 8. In none of these cases was a pronounced developmental trend indicated. Jersild does not have the data arranged so that comparisons may be made on a mental-age basis, but he does have them on the basis of pupils in private schools, bright public-school pupils, and dull public-school pupils. Here the trends are very interesting. In the private schools 19 percent of the pupils favor going to war; of the bright public-school children, 61 percent favor war; and of the dull public-school children, 91 percent favor war under the circumstances mentioned. The bright public-school children all had I.Q.'s above 120 with an average of 144, the dull public-school children had an average I.Q. of 86, and the private-school children an average of I.Q. of 125.

3. Summary and Conclusions on Attitudes

The experimental evidence seems to indicate that certain specific attitudes are readily engendered and modified. Generalized attitudes, however, seem to be much more stable and to have their origin largely in the home. The fact that the social studies play so small a rôle in influencing attitudes is obviously of much importance when we realize that this is considered one of their major functions. The explanation of the failure is not clear; nor is the method for remedying the situation self-evident. That the trouble is not entirely a matter of lack of plasticity is seen from the fact that the rôle of the home, associates, and general atmosphere is great at all developmental levels. Perhaps the absence of real understanding of the concepts involved and the generally poor placement of curricular materials and activities is the chief cause of failure. Certainly, experimentation where the curriculum is better adjusted to the potentialities of the child, and where efforts to inculcate measurable attitudes have been systematically made, is clearly indicated.

Research data on the vital question of the relation between developmental level and attitudes are lacking. We do have good lists of desirable attitudes and we have the techniques of Thurstone and Remmers

for measuring such attitudes. Research utilizing modern techniques of measurement to study the growth of desirable and undesirable attitudes will help answer the important questions of whether or not attitudes are related to mental age and whether or not there are developmental trends in character. A field of research that has not yet been opened is that which would include not only the attitude itself but also an attempt to get at the important factors in its genesis and in its relation to overt behavior.

VI. NEEDED RESEARCH IN THE CURRICULUM OF THE SOCIAL STUDIES

A review of the experimental literature dealing with child development and the curriculum in the social studies indicates clearly some of the research approaches that are needed and that should prove highly productive. Particular needed researches have been indicated at appropriate points throughout this chapter. In general, though, definitive research dealing with the various factors involved in growth in the social studies has yet to be made. Such a program of research must include clear realizations and formulations of the objectives sought in the social studies. It must include investigations of the rôles of motivation, chronological age, mental age, methods of instruction, methods of learning, optimal sequences for materials and activities, socio-economic status, interests, needs, attitudes, maturation, experiential background, rates of growth, patterns of growth, velocity of growth, and direction of growth. The rôle of non-school agencies in forming attitudes and determining achievement must be thoroughly investigated. What are the learning activities at various levels? To what extent may interests be taught and to what extent may they be totally unrelated to readiness? To what extent does mentality change as the other factors affecting growth in the social studies are changed or altered? How different is individual-placement from grade-placement?

The complexity of the research problem in the field of the social studies is enormous. Probably any shift in any of the numerous factors affecting growth in the social studies will make for alteration of any norms experimentally ascertained. Not that the problem is hopeless, but that there must be complete tentative-mindedness and open-mindedness. Definitive research in this field is difficult, but it cannot be dodged if we are to progress. If we do not have careful, critical, safeguarded thinking, then we inevitably have loose, uncritical, haphazard thinking.

Several levels of research are possible. At the basic level the teacher tries placement at various grades, using the same instructional procedures and checking against motivational factors to ascertain optimal placement. At another level co-operative research is imperative. Such research is indicated wherever comparison is to be made over a range of grades, where various degrees of socio-economic status are involved, where the factor of geographic locality is to be studied, and so on. At a highly technical level factor-analysis and the planned experimentation of Fisher can be introduced.

No matter what the level of research indulged in, one of the crucial factors is evaluation. Helpful discussions of this aspect of a research program in the social studies are to be found in the published literature (32, 64).

The crucial rôle of the teacher in any program of research in the social studies has been excellently summarized in *The Changing Curriculum* (20). "The teacher of tomorrow will be essentially an experimenter with an inquiring mind and a growing attitude. He will conceive life as a continually developing process to which he and his pupils may make an easy adjustment. He will follow the facts wherever they may lead and transmit something of his enthusiasm for truth to all those who work with him."

BIBLIOGRAPHY

- (1) ATCHISON, ALLISON E. "Torrid, Temperate and Frigid Zones. Sources of Error in Children's Thinking" *Thirty-Second Yearbook of this Society*, 1933, pp 483-485.
- (2) American Historical Association, Commission on the Social Studies *Conclusions and Recommendations*. (New York: Charles Scribner's Sons, 1934. 168 pp.)
- (3) ANDERSON, JOHN E. Unpublished Study University of Minnesota. 1938
- (4) AYER, ADELAIDE M. *Some Difficulties in Elementary School History*. (New York: Teachers College, Columbia University, Contributions to Education, No. 272, 1926. 70 pp.)
- (5) BARKER, CONSTANCE. "The Measurement of the Relation Between Knowledge of Social Activities and Success in Primary Reading." (Unpublished master's thesis. University of Chicago, 1935)
- (6) BASSETT, SARAH J. "Factors influencing retention of history in the sixth, seventh, and eighth grades." *Jour. Educ. Psych.*, 20: 1929, 683-690.
- (7) BATEMAN, RICHARD M. "The relationship between attitudes toward school subjects and certain other variables." *Bulletin of Purdue University*, 35: No. 4: Dec., 1934, 88-97.

- (8) BATEMAN, RICHARD M., and REMMERS, H. H. "The relationship of pupil attitudes toward social topics before and after studying the topic." *Bulletin of Purdue University*, 37. No. 4 Dec., 1936, 27-42
- (9) BEARD, CHARLES A. *The Nature of the Social Sciences in Relation to Objectives of Instruction*. (New York: Charles Scribner's Sons, 1934. 236 pp.)
- (10) BROOKS, FOWLER D. *Child Psychology*. (Boston: Houghton Mifflin Co., 1937. 600 pp.)
- (11) BURTON, WILLIAM H., et al. *Children's Civic Information, 1924-1935*. (Los Angeles: The Univ. of So. Calif. Press So. Calif. Educ. Mon. 7, 1936. 307 pp.)
- (12) COLE, LUILLA. *Psychology of Adolescence* (New York: Farrar and Rinehart, 1936. 503 pp.)
- (13) CROXTON, W. C. "Pupils' ability to generalize." *School Science and Math.*, 36: June, 1936, 627-634
- (14) FRANKLIN, S. P. "Comprehension of the Sayings of Jesus." *University of Iowa Studies in Character*, 2. 1928, 1-63
- (15) FULLER, ALBERTA HARRIET "The Sense in American History" (Unpublished master's thesis. State University of Iowa, Iowa City, 1927)
- (16) GOODENOUGH, FLORENCE L. *The Measurement of Intelligence by Drawings*. (Yonkers: World Book Co., 1926. 177 pp.)
- (17) HADLEY, J. EDWIN. "Teaching poetry appreciation" *Bulletin of Purdue University*, 37 No. 4 1936, 52-54.
- (18) HALL, G. STANLEY. *Contents of Children's Minds on Entering School*. (New York: E. L. Kellogg and Co., 1893. 56 pp.)
- (19) HALL, HENRY B. "Grade placement of high-school texts in social studies." *Educ. Admin. and Superv.*, 24 March, 1938, 161-168.
- (20) HARAP, HENRY (chairman) *The Changing Curriculum*. (New York: D. Appleton-Century Company, 1937. 351 pp.)
- (21) HARRISON, M. LUCILE. "The nature and development of concepts of time among young children" *Elem. Sch. Jour.*, 34 1934, 507-514.
- (22) HAUPT, GEORGE W. *Experimental Application of a Philosophy of Science Teaching in an Elementary School*. (New York: Teachers College, Columbia University, Contributions to Education, No. 633, 1935. 109 pp.)
- (23) HAZLITT, V. "Children's thinking." *Brit. J. Psychol.*, 20: 1930, 354-361.
- (24) HEIDBREDER, E. F. "Problem solving in children and adults." *Pedagogical Seminary*, 35: 1928, 522-544.
- (25) HOCKETT, JOHN A. "Social studies." *Rev. of Educ. Research*, 7: 1937, 165-171.
- (26) HOLLINGWORTH, LETA S. "An enrichment curriculum for rapid learners at Public School 500: Speyer School." *Teachers College Record*, 39: 1938, 296-306.
- (27) HOPPES, GLADYS J. "Ability of Pupils to Read Pictures for Geographic Purposes." (Unpublished master's thesis. University of Chicago, 1930)
- (28) HORN, ERNEST. *Methods of Instruction in the Social Studies*. (New York: Charles Scribner's Sons, 1937. 523 pp.)
- (29) HOWE, GEORGE F. "A Study of the Ability of Elementary-School Pupils to Read Maps" *Thirty-Second Yearbook of this Society*, 1933, 486-492

(30) "Improving social-studies instruction." *Research Bull. of the Nat. Educ. Assoc.*, 25: November, 1937, 187-258.

(31) JERSILD, ARTHUR. "Children's Information and Opinions." (Unpublished study. Teachers College, Columbia University)

(32) KELLEY, TRUMAN L., and KREY, A. C. *Tests and Measurements in the Social Sciences. Part IV*: Report of the Commission on the Social Studies American Historical Association. (New York: Charles Scribner's Sons, 1934. 635 pp.)

(33) KERR, WALTER E. "A Case Study of Reading Comprehension Difficulties in Geographic Materials." (Unpublished master's thesis, State University of Iowa, 1934)

(34) KORNHAUSER, ARTHUR W. "Changes in information and attitudes of students in an economics course." *Jour. Educ. Research*, 22: Nov. 1930, 288-298

(35) LACEY, JOY MUCHMORE. *Social Studies Concepts of Children in the First Three Grades*. (New York: Teachers College, Columbia University, Contributions to Education, No. 548, 1932. 90 pp.)

(36) LAMMERS, CLAUDE C. "Sources of pupils' information on current affairs." *School Review*, 46: Jan., 1938, 32-36.

(37) Los Angeles City School District. *Books Evaluated by Means of the Vocabulary Grade Placement Formula (Revised to March, 1937.)* (Los Angeles City School District, 1937. 74 pp.)

(38) MACOMBER, F. G. "A placement study in secondary-school economics" *Jour. Exper. Educ.*, 4: 1936, 353-358.

(39) MAHAN, THOMAS JEFFERSON. *An Analysis of the Characteristics of Citizenship*. (New York: Teachers College, Columbia University, Contributions to Education, No. 315, 1928. 44 pp.)

(40) MATHEWS, CHESTER O. *The Grade Placement of Curriculum Materials in the Social Studies*. (New York: Teachers College, Columbia University, Contributions to Education, No. 241, 1926. 152 pp.)

(41) McCONNELL, ROBERT. "Attitudes toward certain proposed social actions as affected by defined educational content." *Bulletin of Purdue Univ.*, 37: 1936, 70-104.

(42) MELBO, IRVING R. "Information of high-school seniors on contemporary problems." *Social Studies*, 27: Feb., 1936, 82-86

(43) MELTZER, HYMAN. *Children's Social Concepts: A Study of Their Nature and Development*. (New York: Teachers College, Columbia University, Contributions to Education, No. 192, 1925. 91 pp.)

(44) MICHELL, F. C. "Ability of fifth-grade pupils to understand certain social concepts." *Calif. Jour. of Elem. Educ.*, 4: 1935, 20-28.

(45) MUNN, NORMAN L. *Psychological Development: An Introduction to Genetic Psychology*. (Boston: Houghton Mifflin Co., 1938. 582 pp.)

(46) PETERS, FRIDIANA, and PETERS, M. ROSANNA. "Children's attitudes towards law as influenced by pupil self-government." *Bull. of Purdue Univ.*, 37: 1936, 15-26.

(47) PETERSON, RUTH C., and THURSTONE, L. L. *Motion Pictures and the Social Attitudes of Children*. (New York: The Macmillan Co., 1933. 75 pp.)

(48) PETERSON, T. D. "The relationship between certain attitudes of parents and children." *Bull. of Purdue Univ.*, 37: 1936, 127-144.

49) PRESCOTT, DANIEL A. *Emotion and the Educative Process.* (Washington, D C.: American Council on Education, 1938. 323 pp)

50) PRESSEY, LUILLA COLE "A study of the fundamental special vocabulary of history from the fourth through the twelfth grades." In Kelly and Krey, *op. cit.*, 155-218.

51) PRESSEY, L. C., and PRESSEY, S. L. "The determination of a minimal vocabulary in American History." *Educ. Method*, 12: January, 1933, 205-211.

52) PRICE, ROY A. "The Use of Activities in Social Studies: A Critical Study of the Effectiveness of Fifty-Two Pupil Activities as Judged by Teachers and Students" (Cambridge Harvard University, Unpublished doctor's thesis. 1938)

53) PROBST, C. A. "A general information test for kindergarten children" *Child Development*, 2. 1931, 81-95

54) REMMERS, H. H. (director and editor). "Studies in attitudes: A contribution to social psychological research methods" *Bull. of Purdue Univ*, 35: 1934. 112 pp

55) REMMERS, H H. (director and editor). "Further studies in attitudes, Series II." *Bull of Purdue Univ*, 37: 1936. 298 pp.

56) REMMERS, H H "Measuring the effect of a lecture on attitudes toward the League of Nations" *Bull. of Purdue University*, 37: 1936, 105-109

57) ROSANDER, A. C "A quantitative study of social attitudes" *School Review*, 43 October, 1935, 614-620

58) Santa Barbara City Schools *Developmental Curriculum.* (Santa Barbara: Board of Education March, 1938 79 pp.)

59) SCOTT, FLORA, and MYERS, GARRY C. "Children's empty and erroneous concepts of the commonplace." *Jour Educ. Research*, 8: 1923, 327-334.

60) SHAFFER, L. F. "The measurement of children's concepts" *Jour. Educ. Psychol.*, 19: 1928, 41-44.

61) SHAFFER, L F. *Children's Interpretation of Cartoons.* (New York. Teachers College, Columbia University, Contributions to Education, No. 429, 1930. 73 pp)

62) SHOWALTER, B. R. *Achievement in the Social Studies in the Elementary School* (New York: Teachers College, Columbia University, Contributions to Education, No. 23, 1925)

63) SMITH, MAURICE N "Comparative social attitudes." *Jour. Educ. Psychol.*, 28: Dec., 1937, 681-693.

64) *Social Studies Curriculum.* (Washington, D. C Department of Superintendence, Fourteenth Yearbook, 1936. 478 pp)

65) *Teachers Guide to Child Development in the Intermediate Grades.* (Sacramento: California State Department of Education, 1936. 631 pp.)

66) THOMAS, KATHERYNE COLVIN. "The Ability of Children to Interpret Graphs" *Thirty-Second Yearbook of this Society*, 1933, 492-494.

67) THORNDIKE, EDWARD L "Improving the ability to read." *Teachers College Record*, 37: Oct., Nov., Dec., 1934, 1-19, 123-144, 229-241.

68) THORP, MARY TUCKER "Studies of the Ability of Pupils in Grades Four to Eight to Use Geographic Tools." *Thirty-Second Yearbook of this Society*, 1933, 494-56.

- (69) THURSTONE, L. L. "Attitudes can be measured." *Amer. Jour. Sociol.*, 6: 1932, 193-255.
- (70) TYLER, RALPH W. (Ohio State University. Unpublished study 1938)
- (71) Virginia State Department of Education *Tentative Course of Study for the Virginia Elementary Schools, Grades I-VII*, (Richmond, 1934)
- (72) WASHBURNE, CARLETON W. "The Grade-Placement of Arithmetic Topics: A 'Committee of Seven' Investigation" *Twenty-Ninth Yearbook of this Society*, 1930, 641-670.
- (73) WESLEY, EDGAR BRUCE. *Teaching the Social Studies: Theory and Practice*. (Boston: D C Heath and Company, 1937. 635 pp)
- (74) WRIGHTSTONE, J. W. "Civic beliefs and correlated intellectual and social factors." *School Review*, 42. 1934, 53-58.
- (75) WRIGHTSTONE, J. W. "Conventional versus pictorial graphs" *Progressive Education*, 13: 1936, 460-462.
- (76) WRIGHTSTONE, J. W. "Findings on Growth from Grade to Grade for Selected Social Studies Skills." (Columbus: Ohio State University. Unpublished study, 1938)

The school's responsibility in the field of social and emotional development becomes more intimate and detailed, according to the extent to which we are disposed to shift not only our methods but also our primary objectives, from the education of the intellect to the development of the total personality. Regardless of what stand may be taken on points of educational theory, there can at the present time be little dissent to the view that research on personality is directly relevant to education.¹

The study of emotions in childhood has led to the recognition of several groups of problems. It will be of service to us here to review these problems briefly, not primarily with the purpose of appraising the methods or theories involved, but in order to establish an educationally significant concept of the emotions.

II. EMOTIONS CONCEIVED AS 'TRAUMATIC' EXPERIENCES

Strikingly simple in form and apparently clear-cut in results were those early studies (59, 60) that sought to portray the conditions eliciting specific emotions, and the specific behavior patterns through which these emotions were expressed. The processes investigated were of a typically episodic or traumatic character. They are best illustrated in the investigation of stimulus-response relationships in anger and in fear. In isolating these apparently specific and distinct patterns, it was felt that the way had been cleared for an experimental study of how emotions develop (development being viewed as essentially a matter of 'conditioning' new stimuli to old emotions). This approach has been most fruitful in stimulating research, but has also been responsible for a number of persistent misconceptions. It has focussed attention upon relatively intense emotions, and has thus created a mistaken belief that emotional processes are 'all-or-none,' and that a child is free from emotion unless he is exhibiting vigorous symptoms of a disturbed condition. Emotional processes thus tend to be seen as essentially disrupting factors, to be restricted and eliminated wherever possible. Such a view is, it would seem, in harmony with the attitude of those teachers who are primarily concerned with 'discipline'; *i.e.*, with the inhibition of spontaneous expression in the interest of maintaining a subdued, emotionless calm in the teaching situation. Moreover, in the preoccupation with relatively intense forms of response, there is a tendency to regard emotions as more or less stereotyped reaction pat-

¹ As examples of recent outstanding publications in this field, the reader is referred to References 50 and 51.

terns, perhaps in some respects similar to simple reflexes. Viewed in this light, it is natural to consider a given tendency, a child's fear of dogs, for instance, as a specific trait probably arising through simple conditioning and capable of being eliminated, or 'disconditioned,' by a simple manipulation of stimulus-response patterns. This, however, fails to do justice to the pervasive character of our emotional processes.

III. EMOTION AS A DYNAMIC BACKGROUND OF EXPERIENCE

In contrast with the point of view indicated in the preceding section, the present tendency is to recognize that emotional components are in some form and to some degree present in all behavior. Since a disemotionalized condition is not conceivable (except possibly in certain pathological states), education faces the problem of how to deal with aspects of behavior that have flux and continuity, rather than merely with specific and separate episodes. The problem of a child's fear of animals, for example, is not to be thought of solely in terms of the occasions when he manifests fear. These expressions are, in part, the symptoms of an underlying emotional organization that cannot always be understood merely by noting the obvious outward signs. A forceful illustration is provided by those cases in which a given fear is 'cured,' only to be replaced a short time later by a new and apparently different fear. Evidence sometimes indicates that, while these disturbances are different and superficially unrelated, they may spring from a common source of tension or maladjustment, and that below these sporadic expressions is a common ground, or, better, a common stream of emotional activity and predisposition. This is, after all, in accord with everyday knowledge, for we speak of children as being timid and fearful, rather than merely as having fears; and as being hot-tempered and irritable, rather than merely as harboring specific angers. It is true that such a conception of general tendency may be too widely applied; it is necessary to keep clearly in view the facts with regard to the situations in which a tendency is expressed, and the contrasting situations in which it does not appear.

IV. EARLY EMOTIONAL EXPERIENCES

An important point to be derived from stimulus-response studies of children at different ages is that early reactions tend to be relatively diffuse and without very clear form or pattern; 'anger' and 'fear,' for example, are often difficult to distinguish in infancy, unless we can

identify them in terms of the situations involved. With increasing age, the generalized excitement characteristic of much of an infant's emotional behavior tends to be replaced by more and more distinct modes of expression. Thus, in Goodenough's study of anger among children from seven months to seven years of age (21), with the younger children anger was commonly shown by simple crying or by a primitive sort of tantrum. With older children it took on a variety of special forms; it was frequently more personal and retaliative in nature or was expressed by a persisting sulkiness or resentfulness.

In the field of emotions, as in other phases of development, age brings a widening of individual differences. This is true not only with regard to 'emotionality' (in terms of the tendency to frequent or intense expression) but also with regard to the many unique ways in which emotion can be incorporated into an individual's attitudes, purposes, and characteristic ways of behaving.

The teacher of young children, particularly at the nursery-school and kindergarten levels, is frequently confronted with situations involving a robust degree of emotional activity. These tempestuous responses, arising from minor physical injuries, frustration, social conflict, or any one of a wide variety of possible mishaps in daily contacts, are easy to recognize, usually transitory, and usually subject to simple methods of control. In the older child, pressure toward more socialized behavior results in restrictions upon a frank and outward emotional behavior. The task of the teacher, in making adaptations to emotional maladjustments, becomes increasingly difficult as these withdraw into more subtle forms of expression, eluding recognition and diagnosis.

V. AN INTERPRETATION OF EMOTIONAL DISTURBANCE

It is possible to interpret most of the more troublesome forms of emotional disturbance in childhood in terms of some felt inadequacy in the child's adjustment to his physical or social environment. Fears and anxieties are closely related to a feeling of inadequacy in some strange, unprepared-for, and possibly menacing situation. Anger and irritations spring frequently from the inability to deal with an interfering or frustrating situation. In infancy these emotionally provocative situations are to a relatively large extent purely physical in nature (the child is frightened by a dog barking, frustrated by a box he cannot open). Insecurities, which are based upon more complex psychological factors, become increasingly important after infancy. In summarizing recent findings on emotional development, Stoddard (53) has pointed out:

Children begin to worry about the future, about dreams and magic, about death and a life hereafter. The world is discovered to be rather more complex and mysterious than they had at first expected. They detect insecurities in the social world of their parents, of their teachers and companions. Persons are not so sure of their place in the world, of what is going to happen to them. Out of such insecurities, if reinforced by a lack of social nourishment, there may emerge a whole series of fear responses. They may be kept at a low level of overt activity as expressed in worries and anxieties, or perhaps develop into definite neuroses or psychoses.

VI. PHYSIOLOGICAL STUDIES OF EMOTIONS

Those types of investigation that make use of instrumental measurement provide evidence of changes with age in the relation of external to internal, or concealed, expressions of emotion. Records of the electro-dermal or psychogalvanic reaction (often utilized as an indicator of 'stress' changes) are relatively difficult to obtain in infancy (29). This has been interpreted as denoting that emotional processes in the infant have a relatively small 'visceral' component; processes involving a heightening of emotional activity drain off readily in the form of crying and bodily movement. Among children of nursery-school age, and still more among older school children, these outgoing responses are to some extent blocked, but internal disturbance (as recorded by the galvanometer, or by pulse, respiration, or blood pressure) may be very marked (30). Thus the process of 'emotional self-control,' demanded by an increasing array of social pressures, may have certain developmental aspects that are not wholly advantageous. Where self-control implies withdrawal of emotion into obscure and devious forms of expression, the effect is not only to remove the symptoms from ready observation, but it may also be to transform a normal healthy outburst into a persisting maladjustive reaction.

VII. CLINICAL APPROACHES

Another approach to this problem, contrasting with the laboratory methods mentioned above, is that of the clinician, who seeks by more subjective, but also more subtly flexible, methods to discover the nature and direction of repressed emotional trends.

The most highly organized conceptual system that is utilized in this connection is that of the psychoanalyst. The psychoanalytic preoccupation is, of course, not with emotional activities in their manifest aspect, but rather with latent or hidden meanings of behavior.

From this point of view, the mental processes of which a child is conscious represent only a small part of his total 'mental' life. The major and dynamically more important part of mental life is 'unconscious.' Conscious and 'preconscious' tendencies are regarded as relatively superficial, in the sense that ordinary methods of inquiry (such as simple or direct association) may readily bring them into view. Tendencies that have been repressed into the unconscious are, by contrast, not usually accessible except through the use of more or less elaborate and formal psychoanalytic techniques. Although our concepts of personality development have been influenced at many points by Freudian theory, a great deal remains to be done to provide empirical verification on the basis of cumulative studies of the development of individual children. An example is the use of 'projective methods,' in which the child through manipulation of toys, blocks, clay, finger, paints, and so forth reveals to the skilled observer unconscious wishes and fears that might not be spontaneously expressed in verbal form. A promising lead for further research is the combined use of physiological and psychoanalytic studies of emotions, for although these are radically different in theory and procedure, the foregoing sections suggest that at certain points (as in the interpretation of repression) they may prove to be closely coördinate.

VIII. RELATION OF SOCIAL DEVELOPMENT TO EMOTIONAL ADJUSTMENT

The adjectives 'social' and 'emotional' are frequently found in close relation, both in descriptive and in analytic accounts of development. Even in infancy emotional disturbance, due apparently to physical or physiological factors, is likely to be complicated by a social factor. An example of this is the case of the child who responds to a loud noise (a 'fear stimulus') by an emotional upset if the sound occurs when the child is alone or in an unfamiliar place, while the identical sound may be readily tolerated if the child hears it in his own playroom and in the reassuring presence of others (31). A sense of insecurity, arising from a lack of status in the family group or in some other immediate social group, may be a most important predisposing factor to emotional disturbances of various kinds; consider, for example, the socially withdrawn child who is abnormally sensitive to fear-producing situations, or the child who, feeling socially rejected, violently over-reacts in protecting himself against minor slights or frustrations. Probably a large proportion of the 'problems' that are tabulated in studies of behavior — nail-biting, stammering, enuresis, dependence,

attention-getting, jealousy, and so forth — are in part reflections of either a basic insecurity in the child's earliest relations with his family or of later anxieties growing out of frustrating or frightening experiences (*i.e.*, fears of physical situations or fears of social rejection). In a later section, we shall deal with some of the emotional consequences of inadequate socialization or of delayed social maturing. The relationship is of course a circular one, for emotional maladjustment is in part the cause, as well as the effect, of handicaps in social adjustment.

IX. SOURCES OF PROBLEMS AMONG SCHOOL CHILDREN

A child psychiatrist (36) lists the following factors (directly associated with school life) as among the sources of personality problems in school children: unhealthy relations to the teacher, unhealthy relations to classmates, physical illness, lack of recreational outlets, experiences of failure, wrong grade-placement, and irregularities in attendance. It is obvious that these factors are interrelated in various ways, and that their relative importance changes as the child grows older. With the widening of individual differences, the factor of "experience of failure" may in the older child have a more vivid significance than at an earlier age. The factor of "classmate adjustment" carries a different meaning at different ages; lack of popularity may be of more profound importance for the individual child in the tenth than in the fifth grade. It is impossible, however, to make generalizations about these matters that would apply widely in different types of school systems, and in different cultural settings. We have no age statistics for causes of personality problems, comparable to data on causes of mortality at successive ages. This is due not only to the complexity of the causes that influence personality, but also to the fact that stable statistics are impossible in a field so sensitive to environmental changes.

X. PSYCHOANALYTIC THEORY CONCERNING EARLY SOCIAL FACTORS IN ADJUSTMENT

Psychoanalytic theory discusses the emotional life of the child in terms of the driving urge of pleasure motives that meet obstacles in the form of parental controls and social conventions. The characteristic reaction to normal inhibitions is the acceptance of social requirements and the development of self-regulation in the pattern that society expects. This process may carry too far, may lead to too great a degree of conformity and compliance. It may also carry astray in the direc-

tion of defiant behavior (leading perhaps to destructivism) or withdrawn behavior (leading to fantasies that express indirectly and symbolically the frustrated motives).

XI. BEHAVIOR PROBLEMS AND THE SCHOOL

The child's status as a social dependent is frequently a source of emotional disturbance, particularly when controls are indiscriminately or rigidly applied by overdominating parents or teachers. It is possible to react to dependence by accepting it as a temporary requirement, to be gradually put aside and outgrown. A less sound adjustment is seen in the child who becomes too dependent, developing inferiority patterns and a sense of helplessness, or at the opposite extreme in the child who exhibits an aggressive striving for power. These deviate reactions in early childhood may in important ways set the pattern of adult personality formations.¹

1. The Incidence of Behavior Problems in Early Childhood

In considering the incidence of behavior problems, it will be convenient to treat early and later childhood separately. There is, of course, no discontinuity in actual development to justify this suggested division. Nevertheless, the differences in the nature of the data available for these groups (which will be considered at a later point) make the distinction desirable.

Perhaps the most striking fact derived from the investigation of behavior problems in early childhood is the high frequency with which these problems occur. Hattwick and Sanders (23), in a recent study of over 500 children aged 2 to 4½ years in Chicago nursery schools, report that negativism occurs in about 20 percent of the cases; temper tantrums ("screams, kicks, throws self on floor") in 35 percent; over-dependence on adults (shown by asking for unnecessary help, looking for praise, or staying close to adults) in 15 percent; "cries easily," 15 percent; fear of animals, 30 percent; fear of strange people, objects, or places, 40 percent; thumbsucking, 10 percent; stuttering, 15 percent; and so forth. Other studies of normal urban children tend in general to confirm this high problem-frequency in the preschool period (4, 17, 21, 28, 39, 43); they lead further to the conviction that the more careful and thorough the research technique, the larger the number of problems

¹ The present account is restricted to only a few of the many factors in personality development; for a more detailed discussion of recent research, consult Nos. 3, 32, 45, and similar references.

reported. From such findings it is clear that behavior which adults call 'problem behavior' is normal in a statistical sense; *i.e.*, it appears frequently. We may regard it either as a natural state of imbalance associated with development or as a product of our particular culture and of the stresses and strains it imposes upon the developing organism. If the former view is correct, we should no doubt lessen our concern about childhood maladjustments. If, on the other hand, we admit the second possibility, we may come to the conclusion that childhood disturbances are to some extent symptoms of a maladjusted society.¹ The types of problems reported most frequently suggest that children today are growing up in a social environment in which insecurity, too little adult support, or too strong adult pressures, are so common as to be 'normal.'

2. The Increase of Behavior Problems with Age

From the foregoing discussion it is only too clear that the child has many behavior patterns that adults may have helped him to acquire, but which they expect him to outgrow. To what extent does the child actually 'outgrow' his difficulties? Every teacher of the primary grades is aware of children whose bladder habits are untrustworthy and require attention, who are tearful and oversensitive, who are over-dependent and jealous, who stutter or lisp. Are such cases merely unsuccessful exceptions in a general learning curve that moves steadily on to improvement? The answer depends upon the problem. For such a condition as enuresis, improvement with age is, for most cases, fairly steady; yet even here, according to a White House Conference report (4), at five years of age there are still about 5 percent of the boys and 1.5 percent of the girls who require attention. On the whole, however, increase in age appears to be accompanied by an increase, rather than a decrease, in behavior difficulties (17, 39).

This may be tentatively explained in terms of the increasing radius of the young child's interests and activities. At certain points, experience overtakes the capacity for adjustment (which is itself dependent on experience); and little by little the number of problems tends, on the average, to rise. No doubt this rise is aggravated by constant pressure on the child for behavior that is both more mature and in greater conformity with adult convenience. Such an hypothesis receives support from the fact that the rising trend of incidence appears especially

¹ The reader is referred particularly to a cogent discussion on this point by Lawrence K. Frank (19).

noticeable in problems relating to social living and the facing of reality. Thus, Macfarlane (39) reports rising trends for oversensitiveness, selfishness in sharing with others, showing-off, and jealousy. The increase in number of problems with age must be interpreted partly in terms of the fact that childhood is a period of differentiation, and that the more desirable traits are also exhibiting an increase in variety and form. An evaluation of the importance of 'number of problems' should probably take into account the relation between areas of tension, anxiety or insecurity, and areas of security or confidence where the child can count on favor or success.

3. The Persistence of Behavior Problems

Too little is known concerning the persistence, within the individual case, of the various behavior problems of early childhood. It is a popular belief — based in part on the easy analogy from physical development — that the early behavior characteristics of the child are of fundamental and inescapable significance. The specific implications of this theory of early childhood dominance remain to be more soundly established. Macfarlane (39) has computed 'coefficients of persistence' for the problems studied in her sample of unselected children, between the ages of 21 and 36 months. It was found that the problem with the highest coefficient of persistence was thumbsucking; the next highest coefficients (for nocturnal enuresis, food-finickiness, hyperactivity, overdependence, negativism, and fears) were only about half as great as for thumbsucking; while the coefficients for other problems (masturbation, "tics and mannerisms," speech problems, destructiveness, excessive demanding of attention, showing-off, aggressiveness, timidity, and jealousy) were still lower. The conclusion drawn was that, for most problems in the age-range of 21 to 36 months, not persistence, but rather transitoriness, is the dominating characteristic.

It must be emphasized, however, that when an individual problem disappears, a change of symptoms may be involved rather than actual improvement in general adjustment. A fearful child, as Shirley (52) has shown, may go through a sequence of screaming at one year, running away at two years, and, we may add, seeking safe isolated activities in the sandpile at three years. Individual children have been observed to show fear tantrums at one period, vomiting at a later period, and nail-biting at a still later period in reaction to situations stimulating anxiety.

4. Behavior Problems in Later Childhood

Turning now to a later period of childhood, we are immediately confronted by the absence of complete studies of unselected, 'normal' cases. A White House Conference report (4) presents some isolated data for unselected children aged 6 to 12, on fears, food-habits, jealousy, and stuttering. It appears that the variety of situations provoking fear between six and twelve years does not decline from the preschool level; if anything, it increases.

a. Stuttering. Of special interest from the point of view of school administration is the increase in stuttering at the age of six reported by Blanton (8), at the age of eight to nine by the White House Conference (4), and through the fifth grade by another White House Conference report (7). The strain of the classroom is probably responsible for at least part of this increasing incidence. The less rapid increase in stuttering among girls (7) accords with the known superior adjustment of girls to school routine, although other factors may be also adduced to account for this.

b. Nervousness. So-called 'nervous habits' have been studied most extensively by Olson (47). In unselected, or 'normal,' school samples from age six to college, Olson has found little if any change in incidence or proportion of the various types of habits.

c. Classroom Problem Cases. A considerable number of the studies of behavior problems in unselected samples beyond the preschool period relate to 'classroom problems.' The following are typical.

McClure (38a) circulated a questionnaire to all teachers of the first eight grades in the public schools of Toledo, Ohio, asking the teachers to report all pupils who could not adjust themselves to the conditions of the classroom, and who, in their estimation, should be referred to the Toledo Juvenile Adjustment Agency. Out of a total of 26,364 children, 533, or 2.02 percent, were reported. The percentage of problem cases rose from 1.5 percent in the first grade to 2.6 percent in the sixth.

In a pioneer inquiry by Haggerty (22), based on teachers' ratings of 801 elementary-school children in Minneapolis, nine problems were found with an incidence of over 5 percent. These problems (in order of magnitude) include disinterest in school work (22 percent), cheating, unnecessary tardiness, lying, defiance to discipline, marked overactivity, unpopularity with children, temper outbursts, and bullying (6 percent).

In the study by Blatz and Bott (9), teachers were required to make

an actual notation of every misdemeanor occurring during the entire school year. A 'misdemeanor' was defined as "any act on the part of the child which necessitated the interruption of the teaching routine for the purpose of dealing with the pupil or pupils in question." Of the twelve types of misdemeanor studied, the most frequent in occurrence were (in order) restlessness, lack of application, disobedience, and disorder.

Wickman (62) made use of a long list of problems, obtaining his data, as Haggerty did, by teachers' ratings. In a sample of 874 elementary-school children in Cleveland, ten problems showed an incidence above 30 percent. These were (in order): whispering, writing notes (75 percent); failure to pay attention; careless in work; tattling on others; disorderly in classroom; interrupting; failure to study; shyness, timidity, withdrawing; daydreaming; and lack of interest in work (32 percent). Wickman was interested, however, not merely in the incidence of problems noted by teachers, but also in the implicit conflict between the criteria for good behavior imposed by the routine of teaching and the criteria for sound personality development that mental hygienists or psychiatrists emphasize. From the teachers' point of view 'problems' include chiefly behavior that interferes with smooth-running classroom teaching. This conflict is probably inherent in a rigidly authoritarian school curriculum, although good teachers from all time have found ways of providing constructive activity-outlets for healthy and spontaneously aggressive pupils. Perhaps a more serious (and often unrecognized) problem for the teacher is the overcompliant child or the non-expressive child who constantly conforms or withdraws.

This tendency to overstress aggressive behavior is suggested by data from the Tilden High School, Brooklyn (6). Of all cases referred to the Guidance Department of the school, four times as many were referred for "predominantly aggressive behavior" as for "predominantly withdrawing behavior" (the percentages are 6.2 and 1.6, respectively). Five percent of the cases were referred for "emotional instability" (with no classification as to aggressive versus withdrawn behavior).

d. Truancy. Truancy is an important and stubborn problem in the schools, with a variety of causes. Psychologically, it is essential to distinguish between (a) truancy due to illness, economic factors, and mere family convenience, and (b) truancy due to willful refusal to attend. Unfortunately, data separating these different classes of truancy appear to be either unavailable or inaccessible. Olson states that "truancy is especially frequent between the ages thirteen and fifteen"

(11). In a study of the Fresno, California, public schools, Gates (20) found no decline in total absence (for all causes) from the junior to the senior high school. Since economic factors favorable to truancy would doubtless operate more strongly in the senior high school, Gates' data indicate that 'psychological truancy' decreases subsequent to the junior-high-school level.

From the child's point of view doubtless many of the items mentioned, such as whispering, writing notes, failure to pay attention, lack of interest in work, and truancy, are his reactions to the problem of school, his way of handling a situation when he is expected to adapt to demands that have little meaning or value to him.

5. Sex Differences

Sex differences in problem behavior have been ably summarized by Wellman (61). Beyond the preschool age, the finding appears universal that boys present more behavior problems than do girls. When rated by their teachers, boys definitely exceed girls in 'disorderliness' and truancy; girls exceed the boys in fearfulness, sensitiveness, suggestibility, and inquisitiveness (62). Girls are slightly more likely to exhibit jealousy (4), to entertain certain fears, such as fear of dogs and fear of storms (4), and to persist in oral 'nervous habits' (47). Boys continue to outnumber girls in stuttering (7) in a ratio of at least 3 to 1 (the proportion rising to about 4.5 in Grade VII, and declining gradually thereafter to about 3).

6. Clinical Data

The data just presented, based on studies of unselected samples, may be supplemented by data from clinic and court groups. One advantage of clinical material is that information for each individual case tends to be fairly complete (within the limitations of available techniques for the collection and interpretation of data).

The most complete statistical study and report of problem cases, within our knowledge, is that by Ackerson (2), based upon 5000 consecutive cases studied by the Chicago Institute of Juvenile Research. In this group the number of 'personality problems' and 'conduct problems' per case tends to rise between the ages of seven and thirteen. Specific problems showing a definite rise with age include such items as daydreaming, sensitiveness, seclusiveness, truancy, masturbation, sex misdemeanors, resentful attitude. Problems showing a definite fall in incidence with age include restlessness, crying spells, bashfulness,

temper tantrums, violence. Problems showing an 'arched' incidence (rise followed by a fall) include jealousy of sibling, truancy from school, defiant attitude, lying, stubbornness, bullying. To what extent these trends apply to normal samples is not, of course, fully known.¹

Beyond the clinic lie the court and the mental hospital. The percentage of children of juvenile-court age who actually appear each year in juvenile court is over 1 percent (15, 57). More than four-fifths of these cases are boys. Mental disease, measured in terms of hospital admission, is relatively infrequent under age 20 (41). Beyond age 15, the rate is consistently higher for males than females. *Dementia praecox* constitutes the group with the highest rate of first admission. From 1910 to 1923, according to Malzberg's analysis (41), resident patients in mental hospitals increased 86 percent in the age-group 10 to 14, 52 percent in the age-group 15 to 20. From 1923 to 1930, the upward trend has continued. Unlike mental disease, rates for juvenile delinquency have, in two careful studies, shown a significant decrease (34, 40). One may speculate as to the nature of environmental trends that lead to such opposed results in the incidence of antisocial behavior as expressed in delinquency, and in mental disease as denoted by hospital admissions.

7. The School's Rôle in Relation to Behavior Problems

What are the duties of the school with regard to the behavior problems of young children? We may think of these as including the alleviation of maladjustments brought by the child to the school, and the prevention of the more serious maladjustments (particularly school maladjustments) of later childhood, which only too often lead, sooner or later, into delinquency and mental disorder. The attainment of these objectives requires, first of all, a properly guided transfer of the child from his home environment to a situation in which nearly half his waking time is controlled by the school. A second essential is a curriculum that can hold the interest and effort of each child, and that will not in itself produce maladjustments through increases in competitive pressures. Underlying this is the factor that may, not very precisely, be termed school 'morale,' which differs widely from school to school even in very similar and closely adjacent districts, and which is directly related to the abilities and attitudes of the administrative, teaching, and counselling staffs. It is apparent that in our present

¹ Additional valuable data on the incidence of behavior problems in a clinic group may be found in the recent report by Fenton and Wallace (16).

culture too many homes are incapable of giving a child enough affection, security, and confidence to carry him through the first strains of his adjustment to school. Is it possible for teachers to provide what is needed in this aspect of a child's education? 'Understanding,' an adequate personal relation with the child, even some warmth of affection from wise teachers may contribute much to a child's confidence in the world of people. Equally important is the child's need to be proficient in something, and the teacher's responsibility to balance criticism with appreciation of positive success.

XII. CYCLICAL CHANGES AND 'CRISES' IN THE COURSE OF EMOTIONAL DEVELOPMENT

Of importance to teachers is the question of possible cyclical changes in emotional development. Do emotional characteristics exhibit a gradual and relatively even course of maturing, similar to the assumed typical maturation curve for intelligence, or do they show periods of relatively sharp change, similar to the growth curve for height? The problem is not an easy one to investigate, since the indications of emotional development are less clear-cut, less generally agreed upon, and less subject to measurement than are the evidences of growth in intellectual or physical characteristics. Busemann (14) has concluded that 'emotionality crises' are more frequent at certain ages, with periods of exceptional excitation occurring typically at intervals of about three years; he places these periods at ages three, six, nine, twelve or thirteen, and sixteen or seventeen.

A number of studies support this contention at certain points. Thus, in a study of nursery-school children, Keens and Blatz (37) reported a greater frequency of emotional episodes at three years. H. E. and M. C. Jones (33) found an increase of fear at three years. Foster (18) reported jealousy as most marked at three to four years. Blatz and Bott (9), in a study of misbehavior in school, found a striking increase of misdemeanors in boys at eight and nine years, with a smaller peak at thirteen and fourteen. Hetzer (24, 25) places considerable stress upon the appearance of a 'negative phase' prior to sexual maturity. This is stated as occurring at from eleven to thirteen years in girls, and about three years later in boys. It is characterized by a period of social withdrawal or by an active antisocial attitude and is followed by an opposed phase of social interest and participation.

For the understanding and prediction of behavior, it would be helpful if we could demonstrate that emotional maturing is specifically re-

lated to biological growth or to the new experiences and status that it brings. Such a relation could be responsible for periods of crisis associated with critical points in physiological development rather than directly with certain chronological ages. A definite chronological relationship would of course be obscured by the fact that individuals differ widely in their rate of physiological maturing. Thus, if a negative phase is associated with the onset of puberty, this would cover a range, not of three, but of five or six years. Moreover, with the exception of pubertal transformations, we have been accustomed to think of physiological changes as gradual rather than abrupt; and this would lead us to expect correlated maturings in emotional traits to be of a cumulative nature, rather than as characterized by marked cycles or oscillations. A careful survey of all the available evidence suggests that where apparent crises appear, these tend to have a relation to social factors rather than directly to biological determinants. A clear illustration of this point may be found in Bayley's (5) study of crying in infants. Bayley found that when infants were subjected to a standardized physical examination and mental-test procedure, crying occurred on the average during about 15 percent of the total time included in the examination. The amount of crying decreased from month to month during approximately the first half year of life and then showed an increase. It would seem reasonable to look for some long-term physiological cycle that might be related to the apparent changes in emotionality. When, however, the total crying was analyzed into crying according to specific causes, it was found that the apparent cycle was due to the compositing of age curves with opposed trends and with different points of origin; thus, crying due to fatigue and to internal disturbances was marked during the first few months, but showed a steady downward trend; crying due to a response to 'strangeness' of the situation was relatively rare during the first few months. At later ages, also, emotional changes are characteristically related to the growth of experience and to general mental maturing, rather than to physiological trends or to specific phases of physical maturing. The changes occurring at puberty would seem to be in part an exception to this principle. In a later section we shall consider these pubertal personality changes in more detail, with an interpretation based partly on the forces of biological maturing, partly on the rôle of cultural factors, and with reference also to psychological factors (in the more purely personal sense).

XIII. NORMAL SOCIAL BEHAVIOR

The study of sick or neurotic persons has provided many leads for the interpretation of everyday behavior among normal adults. In like manner the analysis of behavior disorders of children has thrown light on motivating factors in 'normal' social behavior. But in the case of children it is relatively easy to make direct observations of social behavior in free-play situations or in experiments designed to sharpen and refine our hypotheses. The variability of social behavior and the shifting modes of expression of social interest have been clearly brought out by recent research. We have already noted that specific 'problems' are likely to be transitory when we observe children from one year to another. Jersild and Fite (27) have shown how an apparently happy, normally adjusted child may become isolated and unsocial when a radical change occurs in his social environment, such as the loss of a daily companion and best friend. Parten (48) has indicated how leadership may vary from one period of the year to another, as a child's relative status in his group changes. Murphy (46) has followed variations in children's aggressive and sympathetic behavior from one month to another on the playground, and from one situation to another in the experimental room, concluding that decreases in sympathy from a desirable level or increases in aggression beyond a desirable point are usually connected with a threatened ego or with changes in the child's security. Children lacking in ascendant behavior toward their peers were trained in skills with special games by L. M. Jack (26), who found that after such training their ascendant behavior had increased beyond that of children earlier rated at the top of the group. This may be understood in terms of the increased self-confidence the new skill contributed to the child, and emphasizes again the importance to the child of socially valued skills that education can contribute.

The importance of some such general sense of self-confidence for almost every sort of outgoing social response is suggested by the results of Williams' (63) analysis of ratings made on nursery-school children on thirty traits. Whenever a number of positive social traits are analyzed statistically, they are found to be positively correlated in such a way as to suggest that they are different expressions in different situations of a general tendency to be 'outgoing.' Thus, at the preschool level a child who is normally sympathetic when another child is in trouble is also apt to defend himself when necessary and to show a normal amount of aggression in other ways. Results of this sort rein-

force the conclusion that the most effective method of producing any sort of desirable behavior, as well as eliminating undesirable behavior, is probably to reinforce the child's underlying security or self-confidence rather than to attack the 'symptom' or didactically to tell the child what to do. A teacher whose respect for children and pleasure with them is releasing and stimulating to them will produce desirable social behavior more quickly than the repressions and commands of a teacher who, under the compulsion of a rigid school system, 'knows the right thing to do' and anxiously or tensely tries to make the child do it.

While we know that a considerable amount of direct aggression is part of the everyday social experience of normal children in the nursery school, we do not have an adequate picture of the patterns of social development from the preschool level to adolescence. Intensive studies of a small number of children in New York suggest that at six or seven years of age there is an intensified need among boys to demonstrate their masculinity;¹ this is probably a natural prelude to the sharply defined girls' groups and boys' groups that emerge by the third grade, as shown in Moreno's (44) analysis of social structures in the elementary school. In connection with this vigorous demonstration of masculinity, aggression begins to take more patterned forms of wrestling and 'having a fight' instead of the fluid episodic pattern it shows at the preschool level. Do schools, in general, tend to afford more outlet for the increasingly masculine interests of boys of this age than for the feminine interests of girls?

The development of more definite patterns of behavior is also apparent in the increased interest in organized games, clubs, and rules demonstrated by Piaget's studies of children's increasing grasp of rules (49). The data from Piaget and from Lerner (38) indicate how important it is for teachers and parents to adapt their demands to the developmental level of the children with whom they are dealing. This implies adaptation not merely to the intellectual level involved in the comprehension of rules, but also to the maturity level involved in the ability to subordinate ego-centric impulses to group needs. Burks' (13) study of children's response to criticism indicates that the child's ability to make constructive use of criticism depends both upon the maturity of his ego development in the direction of objectivity, and his skill in assimilating and using a suggestion or a criticism. Criticisms given at a period of ego-insecurity or by a person who arouses insecurity in a child, or criticisms that a child cannot understand or apply are not

¹ Unpublished study by Bureau of Educational Experiments, New York.

likely to contribute to learning. In this connection we may also remind ourselves that while a great deal of study has been made of the effects of praise versus reproof, or rewards versus punishment, in improving the output or achievement of elementary-school children, almost no analysis has been attempted of the effects of such procedures on emotional and personality development or on subsequent confidence and stability in attacking new problems.

It may be argued that the business of education is not only to accomplish certain immediate ends in terms of arithmetic tables memorized, but also to develop the child's confidence in teachers and educational authorities, and sufficient satisfaction or pleasure in learning to send the child out of school wanting to learn more.

XIV. ADOLESCENT DEVELOPMENT

1. The So-Called 'Stages' of Adolescence

Numerous descriptions have been offered of behavior changes during adolescence. Adolescent crises are described by Mead (42) as a function of the culture, rather than an inevitable expression of growth. Thus, in Samoan communities she finds no evidence of emotional problems that could properly be characterized as 'adolescent conflicts.' We have already referred to Hetzer's findings concerning a preadolescent 'negative phase.' Bühler (12) refers to (a) a period of increased vitality, with feelings of increased self-power and tendencies to boastfulness and elated behavior; (b) a negative attitude, occurring, in girls, during two to six months immediately preceding the onset of menstruation, and in somewhat similar form among boys fourteen to sixteen; and (c) an increased intensity of social interest and of friendship after puberty has been reached.

The foregoing generalizations are based upon observational studies of Viennese children. Other European investigations have emphasized a variety of aspects of personal and social development. Vorwahl (58) describes the period from ten to fourteen years as marked by "the love of secrecy," "conspirator fantasies," the impulse to show off, emotional instability, playfulness, and sexual curiosity. This period is followed, according to Tumlirz (56), by a phase from fourteen to seventeen in which the child is typically concerned with the "subjective realization of the ego as contrasted with the world outside." An imaginative tendency toward fantasy and play-acting is replaced, at maturity, by a more objective, rational, and practical attitude. H. Jung (35), from a study of school boys in the Rhine valley, distinguishes

among the following three stages: (1) prepuberty, characterized by excessive energy, negativism, and a practical interest in discovery and experience; (2) puberty, with a more introspective interest in the individual self; and (3) postpuberty, after seventeen years, marked by a return to a more objective and realistic point of view.

When we compare these European studies with American investigations, the principal difference to be noted arises from the reluctance of contemporary American psychologists to discriminate clearly marked 'stages.' Although individuals may show abrupt shifts in interest and attitude, the central tendencies for groups appear to change by degrees and slowly. We are, moreover, aware not merely of central tendencies, but also of extremely wide variations within each age-group. The American literature on adolescence is less positive and spectacular than the European and is much more likely to be qualified by exceptions and footnoted by reservations.

In general, we find an agreement that adolescent changes involve an increasing sensitivity to social stimulation; an increasing conformity to social norms concerning recreation, attitudes, and dress; a gradual reorientation with regard to friendships and the emergence of heterosexual attachments; and new group patterns of subordination and leadership.

2. The 'Reputation Test'; An Appraisal of Adolescent Values

Adolescence is a period of rapidly changing values. Few attempts have been made to appraise these changes in values, attitudes, and needs, except on the basis of uncontrolled observation and general impression. Unique in method is the study by C. M. Tryon, who has applied a "reputation test" annually from the sixth to the twelfth grades to pupils used in one of the California growth studies.¹ The test covers twenty personality characteristics in the form: "Here is a boy who often goes out with girls, likes to go to dances and parties —. Here is a boy who isn't much interested in going out with girls, doesn't often go to parties or dances —." A pupil's score on a given characteristic is derived from the number of times his classmates 'vote' for him in connection with that characteristic.

The analysis of the reliability or consistency of measurement shows interesting age differences; thus on the trait 'good looking,' reliable reputation measures are not obtained at twelve years (reliability coefficients are .63 for

¹ Results for a comparison of twelve- and fifteen-year-old pupils are given in Reference 55.

boys, .77 for girls). But at fifteen years, with an increased ability to discriminate and perhaps with more stable criteria, coefficients are .95 and .93 for boys and girls.

A correlational analysis of the reputation scores resulted in grouping certain traits into 'clusters.' Thus, the characteristics 'daring,' 'being a leader,' 'active in games,' and 'friendly' were for twelve-year-old boys found to be homogeneous, and for convenience were given the general name of "social ascendancy." The comparable trait-cluster in girls did not, however, include 'active in games' or 'friendly.' A detailed analysis shows many points at which the organization of trait clusters differs for boys and girls, and for younger as compared with older pupils. This is another way of saying that the behavior pattern involving, for example, 'social ascendancy' is arrived at in different ways, with components that differ according to the factors of age and sex. The statement is not a novel one, but the quantitative analysis of it is new. The following excerpts from Tryon's monograph (55) illustrate a few of the interpretations that emerge from a study of the correlational data.

Among the traits which show the most marked and most interesting sex difference we should include those which involve restlessness, 'unkemptness,' fighting, participation in games, and assurance in class. Restlessness is interesting because it clearly differentiates the sexes in the attitude toward conforming to classroom standards. For the twelve-year-old girls 'restlessness' has derogatory implications. For the twelve-year-old boys it has some prestige-lending qualities; for example, it is associated with 'sense of humor about jokes' — possibly misbehaving in the classroom is itself considered funny and a contribution to social success. These relationships still hold for the older boys' group, but not so markedly, and for them it is much more definitely considered a young or childish way of behaving.

The variable pertaining to unkemptness is interesting because it tends to have almost completely opposed values for the two sexes at twelve years. To think about keeping oneself clean, neat, and tidy-looking is apparently incompatible with those qualities most admired in the twelve-year-old boy, but to the girl it is essential. However, the fifteen-year-old boys are much more like the younger girls; they place even more emphasis on tidiness than the younger girls did, and we shall see later that they emphasize its importance more than the fifteen-year-old girls do.

In general, the twelve-year-old boys tend to emphasize as desirable traits, expressive, outgoing, and aggressive characteristics (illustrated by their correlations with 'popular,' and so forth); whereas girls in this cultural group tend to place higher values upon decorous conduct, even to the point of involving submissiveness or withdrawing behavior.

In an attempt to generalize the age changes occurring in this three-year period, Tryon states:

During the period between ages twelve and fifteen, values for girls have undergone striking change; values for boys have undergone relatively minor changes, mainly in terms of slightly shifted emphases. At twelve years girls idealize behavior which conforms to demands and regulations of the adult world. By the age of fifteen, girls have ceased entirely to idealize these demure, docile, rather prim ladylike prototypes and have accepted instead many of the criteria for the idealized boy, emphasizing the desirability of extroversion, outgoingness, and activity. In addition, the quality of being attractive to the other sex has become important but is looked upon as relatively specific or unrelated to other desirable qualities. At the 12-year level the idealized boy is skillful and a leader in games; his daring and fearlessness extend beyond his social group to defiance of adult demands and regulations. Anything which might be regarded as feminine, such as extreme tidiness or marked conformity in the classroom, is regarded as a weakness. At fifteen years prestige is still in a large measure determined by physical skill, aggressiveness, fearlessness. Defiance of adult standards, though still acceptable and rather amusing to them, has lost emphasis and tends to be associated with immaturity. In addition, greater emphasis is placed on personal acceptability, suggesting the effectiveness of rising heterosexual interests.

In studying the sex differences revealed by these data one is impressed with the lack of steadfastness to ideals revealed by the girls as compared with the boys over this relatively short period of three years. These data may serve to confirm the idea in the minds of some readers that the behavior of the female of the species is characterized by expediency, design, irresoluteness, and caprice. The writer confesses to a much greater interest in another aspect of the phenomenon; namely, the much greater demand put upon the girls as compared to the boys for flexibility, capacity to readjust their ideals, reorient themselves to new goals.

It is of course recognized that these findings, which are clear-cut for a fairly representative California public school, might not hold equally well in Vermont or in Louisiana. Not merely regional cultural differences, but also differences in teaching personnel (*e.g.*, men teachers versus women teachers), in the sex composition of classes (*e.g.*, segregated versus co-educational groups), and many other factors may conceivably have an influence upon the way in which adolescent changes are expressed. At this point we appear to have a promising field for coöperative research in different geographic areas.

3. Free-Play Activities in Adolescence

Another approach to the study of adolescent changes is through the observation of mixed groups of pupils in free-play activities. Such studies, common at the preschool level, have been carried on systematically for older children at only a few centers. A recent example is the 'clubhouse' maintained (adjoining a junior high school) for members of the adolescent study at the University of California (54). The differences between boys and girls in the rate of sexual maturing are particularly evident between the ages of twelve and fifteen. Discrepancies in physical size and in social orientation are conspicuous in the period from the seventh to the ninth grade. The clubhouse had little appeal for the majority of boys in the seventh grade; their interests were rather in individual activities or in playground sports; when they came to the building, it was chiefly to participate in games of checkers or ping-pong, or in special projects, such as shopwork or photography, at the same time that the girls were playing dance music and practicing, with each other, the latest steps. By the latter part of the eighth grade, clubhouse records show that mixed dancing had become the favorite activity, and that other interests (in an art project, in reading, shopwork, and games) were rapidly declining. The increasing preoccupation with social activities was accompanied by an increasing sensitivity to group interests and standards, a weaning from the home, the development of independent criteria for conduct, and a negative attitude toward adults. In their relationship to adults, even within the period of a year, many adolescents show an interesting sequence of (a) childish dependence, (b) an increasing independent attitude, marked by either indifference or negativism, (c) the acceptance of adults on a friendly and equal basis.

4. Psychological Differentiation of the Sexes

Perhaps one of the outstanding features of development in this period is the psychological differentiation of the sexes.

The girl feels a necessity to prove to herself and to the world that she is essentially feminine; the boy needs to demonstrate that he has those masculine qualities which will require others to recognize him as a man. This characteristic accounts for the girls' spending a large part of their leisure time in shopping and in personal adornment. This is the secret of the manicured nails, painted red to match vivid lips. This is why they must wave and curl their hair, and, having perfected the

process, must pin into it ribbon bows, bits of lace, or flowers. This is the reason for the boy's urge to learn to drive a car and for his willingness to move heaven and earth to borrow or own one. Along with this development, also, we are told by our group that a girl to be popular must be modishly pretty, keep herself clean and neat, be a good mixer. A boy, on the other hand, must be aggressive and must excel at sports. He must have the ability to dance and to talk easily with girls, and in addition he must show that he can compete readily with other boys; that he can achieve and master. This picture of adolescent development is often disturbing to adults, but it should be reassuring to know that, once the girl has arrived at the status in the group to which she has aspired, or has learned to adjust herself to a version of the universal feminine model which suits her own personality, she will be a happier person and a pleasanter one to teach or to have around the house. Likewise, once the boy feels that he is accepted as a man, he can go on with the important business of preparing himself for a job or for college. We have repeatedly noticed that those boys and girls who have acquired some understanding of their personal relations to others and have made a place for themselves in a mixed group, have become more stable and predictable. Teachers, and parents, say that they have 'settled down' (54).

5. Delayed Maturity

The effect of delayed maturity upon emotional adjustment has been discussed by Abernethy (1). Abernethy was able to show a tendency toward maladjustive patterns in girls exceptionally delayed in maturing; from later studies there is ground for believing that atypical development may at this age be even more important for boys. In a representative school sampling of one hundred boys, Stoltz, Jones, and Chaffey (54) report:

The accumulated records on these one hundred boys show ten who were two or more years retarded and an equal number who were two or more years accelerated in appropriate male structural and functional characteristics, described in chronological age norms. In addition there were seven boys whose structural characteristics showed not only retardation in the development of maleness but an actual tendency toward the normal female pattern. In only one or two cases was there evidence that precocity contributed to maladjustment, but eight of the ten retarded boys gave evidence of emotional insecurity, and all of those who exhibited sex-divergent structural characteristics were significantly disturbed by it.

6. The Problem of Homogeneous Social Groups

The unequal rate of maturing of boys and girls, with corresponding social and emotional discrepancies at certain ages, has led to a number of suggestions as to homogeneous grouping. To what extent should we renounce sectioning on the basis of intelligence and educational levels in order to equate groups in terms of equivalence of social interests? This would involve, for example, bringing together boys and girls in groups in which the girls average from one to two years younger, and from one to two years lower in mental age. In the languages, in which sex differences tend to favor girls, such a change could perhaps be effected without serious difficulties, but in mathematics (in which sex differences in abilities tend to favor boys) an additional intellectual disparity would produce a difficult problem for the teacher. Of course, it must be recognized that certain of the sex differences obtained in school subjects may be a result of teaching methods in a given cultural situation, and that a modification of the school program, in the direction of a more normal adjustment of the sexes, might reduce the importance of these sex differences. There is danger, however, that in remedying discrepancies in our classes in one aspect of maturity, we will produce even more serious discrepancies with regard to other factors.

XV. SUMMARY

In all periods of development, emotional processes provide a dynamic background to behavior. When we speak of educational goals, procedures, and outcomes, we imply correlative emotional factors in a child's interests, strivings, and satisfactions. The normal development of emotion involves a progressive change from simple undifferentiated processes to complex patterns penetrating every phase of conduct and having many indirect modes of expression. Typically, a large part of emotionally tinged behavior in becoming 'socialized' is repressed into inward-turning or even unconscious patterns of activity. 'Nervous habits,' 'behavior problems,' 'neurotic tendencies,' and the like may be regarded as disorders of emotional development, resulting from inappropriate social pressure or an inadequate capacity on the part of the child to assimilate social requirements at a given period of growth. Our problem in education is not to eliminate emotion, but to utilize it. If, then, the emotional components of behavior are to be retained as an important aspect of educational experience, we must study emotional development, not merely with reference to factors that produce mal-

adjustment, but also in more positive terms with regard to the rôle of emotional factors in learning and in general maturing. Both experimental and clinical methods are available for such a study. At this time particular importance may be attached to observational studies of children in social situations, and to the analysis of the social environment of the school child in terms of his reputational status among his classmates, as well as in terms of interpersonal relationships in the home. In the late preadolescent and adolescent periods, we must also give especial heed to findings based on physical examinations and physiological assays of the maturing individual. The feeling of security that we regard as basic to any adequate emotional adjustment may be supported or disturbed in many ways, in relation to a child's biological, cultural, educational, or personal-social status. An understanding of these factors requires more than a study by specialists of specific aspects of intelligence and achievement; to an increasing extent it appears that in teaching situations, as well as in counselling, our interest must extend to the child as an individual and to the total environment in which he is developing.

BIBLIOGRAPHY

- (1) ABERNETHY, E. M. "Correlations in physical and mental growth" *Jour. Educ. Psychol.*, 16: 1925, 458-466, 539-546
- (2) ACKERSON, L. *Children's Behavior Problems*. (Chicago: University of Chicago Press, 1931)
- (3) ALLPORT, G. W. *Personality: A Psychological Interpretation*. (New York: Henry Holt and Co., 1937 588 pp.)
- (4) ANDERSON, J. E. (chairman). *The Young Child in the Home* Report of the Committee on the Infant and Preschool Child, White House Conference on Child Health and Protection. (New York: D. Appleton-Century Co., 1936)
- (5) BAYLEY, N. "A study of the crying of infants during mental and physical tests." *Jour. Genet. Psychol.*, 40: 1932, 306-329
- (6) BECKER, E. G. *Guidance in Progress in a Large City High School*. Third Annual Report of the Guidance Department of the Samuel J. Tilden High School (Brooklyn, N. Y.: the School, 1938)
- (7) BERRY, C. S. (chairman). *Special Education: The Handicapped and the Gifted*. Report of the Committee on Special Classes, White House Conference on Child Health and Protection. (New York: D. Appleton-Century Co., 1931)
- (8) BLANTON, S. "Speech disorders." *Mental Hygiene*, 13: 1929, 740-753.
- (9) BLATZ, W. E., and BOTT, E. A. "Studies in mental hygiene of children: I. Behavior of public school children—a description of method." *Ped. Sem. and Jour. Genet. Psychol.*, 34: 1927, 552-582.
- (10) BRIDGES, K. M. B. "Emotional development in early infancy." *Child Development*, 3: 1932, 324-341.

(11) BRUECKNER, L. J. (committee chairman). *Thirty-Fourth Yearbook of this Society*. (Bloomington, Ill : Public School Publishing Co, 1935)

(12) BUHLER, C. "The social behavior of children" In Murchison, C. (editor), *Handbook of Child Psychology* (Worcester, Mass.: Clark University Press, 2d ed., 1933, 374-416)

(13) BURKS, B. "Children's Criticism in the Light of Piaget's Developmental Theory." (Program of the Forty-fourth Annual Meeting of the American Psychological Association, September, 1936, p. 50)

(14) BUSEMANN, A. "Die Erregungsphasen der Jugend" *Zsch. f. Kinderforsch.*, 33: 1927, 115-137.

(15) CABOT, F. P. (chairman). *The Delinquent Child*. Report of the Committee on Socially Handicapped (Delinquency), White House Conference on Child Health and Protection. (New York. D. Appleton-Century Co., 1932)

(16) FENTON, N., and WALLACE, R. "Child guidance in California communities. Part 4. A statistical study of 1660 cases referred to the California Bureau of Juvenile Research." *Jour. Juvenile Research*, 21: 1937, 125-179.

(17) FOSTER, J. C., and ANDERSON, J. E. *The Young Child and His Parents*. (Minneapolis: University of Minnesota Press, 1930)

(18) FOSTER, S. "A study of the personality make-up and social setting of fifty jealous children." *Mental Hygiene*, 2: 1927, 53-77.

(19) FRANK, L. K. "Society as the patient." *Amer. Jour. Sociol.*, 42. 1936, 335-344

(20) GATES, G. A. *A Study of Average Daily Absence in the Public Schools of Fresno, Calif.* (M. A. thesis, University of California, 1929)

(21) GOODENOUGH, F. L. *Anger in Young Children*. (Minneapolis: University of Minnesota Press, 1931)

(22) HAGGERTY, M. E. "The incidence of undesirable behavior in public-school children." *Jour. Educ. Research*, 12: 1925, 102-122.

(23) HATTWICK, L. A., and SANDERS, M. K. "Age differences in behavior at the nursery-school level." *Child Development*, 9: 1938, 27-47.

(24) HETZER, H. *Der Einfluss der negativen Phase auf soziales Verhalten und literarische Produktion pubertierender Mädchen*. Quell. u. Stud. z. Jugendk., No. 4. (Jena: Fischer, 1926)

(25) HETZER, H. "Systematische Dauerbeobachtungen am Jugendlichen über den Verlauf der negativen Phase" *Zsch. f. pad Psychol.*, 28: 1927, 80-96.

(26) JACK, L. M. *An Experimental Study of Ascendant Behavior in Preschool Children*. (Iowa City: University of Iowa Studies in Child Welfare, Vol. 9, No. 3, 1934)

(27) JERSILD, A. T., and FITE, M. D. "Children's social adjustments in nursery school." *Jour. Exp. Educ.*, 6: 1937, 161-166.

(28) JERSILD, A. T., and HOLMES, F. B. *Children's Fears*. (New York: Teachers College, Columbia University, Child Development Monographs, No. 20, 1935)

(29) JONES, H. E. "The galvanic skin reflex in infancy." *Child Development*, 1: 1930, 106-110.

(30) JONES, H. E. "The galvanic skin reflex as related to overt emotional expression." *Amer. Jour. Psychol.*, 47: 1935, 241-251.

- (31) JONES, M. C. "Emotional development." In Murchison, C (editor), *Handbook of Child Psychology*. (Worcester, Mass: Clark University Press, 2d ed., 1933, 271-302)
- (32) JONES, M. C., and BURKS, B. S. *Personality Development in Childhood* (Washington, D. C.: Monographs of the Society for Research in Child Development, Vol. 1, No. 4, 1936. 205 pp.)
- (33) JONES, H. E., and JONES, M. C. "A study of fear" *Childhood Educ.*, 5: 1928, 136-143.
- (34) JONES, V. "Relation of economic depression to delinquency, crime, and drunkenness in Massachusetts" *Jour. Soc. Psychol.*, 3: 1932, 259-282.
- (35) JUNG, H. *Das Phantasieleben der männlichen werkatigen Jugend*. (Münster: Helios-Verlag, 1930. 141 pp.)
- (36) KANNER, L. *Child Psychiatry*. (Baltimore: Thomas, 1935. 527 pp.)
- (37) KEENS, H., and BLATZ, W. E. "A study of situations arousing emotional behavior in nursery-school children." *Twenty-Eighth Yearbook of this Society*, 1929.
- (38) LERNER, E. "The problem of perspective in moral reasoning." *Amer. Jour. Sociol.*, 43: 1937, 249-269.
- (38a) McCLURE, W. E. "Characteristics of problem children based on judgments of teachers." *Jour. Juvenile Research*, 13: 1929, 124-140
- (39) MACFARLANE, J. W. *Studies in Child Guidance: I. Methods of Data Collection and Organization* Monographs of the Society for Research in Child Development. (Washington, D. C.: National Research Council, 1938)
- (40) MALLER, J. B. "The trend of juvenile delinquency in New York City: a summary of a comprehensive report." *Jour. of Psychol.*, 3: 1937, 1-25
- (41) MALZBERG, B. "A statistical study of the prevalence and types of mental disease among children and adolescents." *Psychiatric Quar.*, 5: 1931, 511-537.
- (42) MEAD, M. *Coming of Age in Samoa*. (New York: Morrow, 1928. 297 pp.)
- (43) MICHAELS, J. J., and GOODMAN, S. E. "Incidence and intercorrelations of enuresis and other neuropathic traits in so-called normal children." *Amer. Jour. Orthopsychiatry*, 4: 1934, 79-106.
- (44) MORENO, J. L. *Who Shall Survive?* (Washington, D. C., Nervous and Mental Disease Monograph Series, No. 58, 1934)
- (45) MURPHY, G.; MURPHY, L. B.; and NEWCOMB, T. M. *Experimental Social Psychology*. (New York: Harper and Brothers, 1937. 1,121 pp.)
- (46) MURPHY, L. B. *Social Behavior and Child Personality*. (New York: Columbia University Press, 1937. 344 pp.)
- (47) OLSON, W. C. *The Measurement of Nervous Habits in Normal Children*. (Minneapolis: University of Minnesota Press, 1929)
- (48) PARTEN, M. B. "Leadership among preschool children." *Jour. Abnorm. and Soc. Psychol.*, 27: 1933, 430-440
- (49) PIAGET, J. *The Moral Judgment of the Child*. (New York: Harcourt, Brace and Co., 1932. 418 pp.)
- (50) PLANT, J. S. *Personality and the Cultural Pattern*. (New York: Commonwealth Fund, 1937. 432 pp.)
- (51) PRESCOTT, D. A. *Emotion and the Educative Process*. (Washington, D. C.: American Council on Education, 1938. 323 pp.)

- (52) SHIRLEY, M. *The First Two Years. Vol 3: Personality Manifestations.* (Minneapolis. University of Minnesota Press, 1933. 228 pp)
- (53) STODDARD, G. D. "The educability of emotional behavior" *Educ Record*, 19: 1938, 158-168.
- (54) STOLTZ, H. R.; JONES, M. C.; and CHAFFEY, J. "The junior-high-school age" *Univ. High School Jour*, 15: 1937, 63-72.
- (55) TRYON, C. M. "Evaluation of Adolescent Personality by Adolescents" (Unpublished monograph. Institute of Child Welfare, University of California, Berkeley, Cal.)
- (56) TUMLIRZ, O. "Wiederholungen in der seelischen Entwicklung" *Vjsch. f. Jugendk*, 4: 1933, 193-203
- (57) U. S. CHILDREN'S BUREAU *Juvenile Delinquency in Maine*. Bureau Publication No 210 (Washington, D. C : Government Printing Office, 1930)
- (58) VORWAHL, H. *Psychologie der Vorpubesertät. Eine Einführung in das Eigenleben der Halbwuchsigen*. (Berlin: Dümmler's Verlag, 1929 160 pp)
- (59) WATSON, J. B. *Psychology from the Standpoint of a Behaviorist* (Philadelphia: J. B. Lippincott Company, 1919 448 pp)
- (60) WATSON, J. B., and MORGAN, J. J. B. "Emotional reactions and psychological experimentation." *Amer. Jour Psychol*, 28: 1917, 163-174
- (61) WELLMAN, B. L. "Sex differences" In Murchison, C (editor), *A Handbook of Child Psychology*. (Worcester, Mass: Clark University Press, 2d ed., 1933, 626-649)
- (62) WICKMAN, E. K. *Children's Behavior and Teachers' Attitudes* (New York: The Commonwealth Fund, 1928)
- (63) WILLIAMS, H. M. "A factor analysis of Berne's 'social behavior patterns in young children.'" *Jour. Exp. Educ.*, 4: 1936, 142-146

CHAPTER XIX

SOME THEORETICAL AND PRACTICAL IMPLICATIONS OF THE DATA ON DEVELOPMENT

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It has been necessary, for the reasons already pointed out in the Prefatory Note to Section II, to consider the various fields of children's learning and activities separately. As said at that point, this in no way implies that the actual organization of work within the classroom on the basis of such compartmentalization is either necessary or desirable.

I. INTERRELATIONS OF SCHOOL SUBJECTS AND OF ASPECTS OF CHILD DEVELOPMENT

The interrelation of the various fields and their common relation to the child's developmental readiness should be obvious to any teacher or curriculum-maker. Over and over again, the factors of physiological maturity, mental age and its possible sub-divisions in terms of the maturation of the various mental functions, and the experiential background of the child have been discussed as having direct bearing upon the readiness of the child for any given experience or type of learning. These factors affect everything the child undertakes.

Language development and reading are closely interrelated. They in turn depend upon and foster the child's growth in an understanding of the social sciences and the physical and biological sciences. The relation of quantitative thinking and manipulation to these other fields is less obvious but not less real. Certainly experience with measuring in all its phases and experience with numbers and their relations are essential parts of the child's life, affect his understanding of things he reads, affect his expression through language, affect his grasp of geographical and historical relationships, affect his approach to science, and, in turn, are affected by all these things. Similarly, the practical arts and skills, the fine arts, and the child's emotional and social adjustments are interrelated with all his other experiences.

Emphasis throughout this Yearbook is upon the knowledge the

teacher must have of her children and the adjustment of their new learnings and experiences to their development in all phases, including their whole experiential background.

The curriculum, to be effective, must be organized in terms of the level of development reached by the children, but as has been made evident repeatedly, the children in a given classroom are at many levels of development and the same child is not at the same level of development with respect to his readiness for the various types and aspects of learning and experience. It is obvious, therefore, that the form of school organization in which the same assignment is given to a whole class, and in which all members of the class make the same preparation from the same text and are then measured by the same standards, is essentially unsound. It is based upon the hypothesis that practically all children in a given school grade have reached the same level of development, which is approximately a year in advance of that of the grade below and a year less than that of the grade above. Variations are assumed to be relatively minor and susceptible of adequate recognition through more home study and harder work on the part of the less able and through minor variations in the standard of achievement as indicated by a range of passing marks. Even before any systematic studies of child development were made, the fallacy of this hypothesis was evident from intelligence and achievement tests. Almost every classroom of thirty or more children has been found to include a range of mental ages of four or five years and a range of achievement in each of the various school subjects tested of four or five grades.

II. INDIVIDUAL DIFFERENCES IN DEVELOPMENT AND INSTRUCTIONAL HOMOGENEITY

The policy of continuous promotions now being adopted by many schools is in part a recognition of the failure of the traditional scheme to bring about anything that approaches the homogeneity that would permit relatively undifferentiated class instruction. At the same time it adds still further to the range of development levels within the classroom.

Homogeneous grouping may or may not be theoretically desirable; it is a practical impossibility. The individual child is not homogeneous, but has a profile of development made up of peaks and valleys in the various mental and physiological functions and types of background experience. A small group of children within a room may, at a particular moment, be at approximately the same developmental

level in regard to certain aspects of arithmetic, or of reading, or of science, or of practical or fine arts, but these same children may differ radically from each other in one or several or all others of these fields. Furthermore, a few weeks or a few months later, the children who were at approximately the same developmental level in regard to a single field may be widely scattered, because rates of development differ and intervening experiences differ.

Groupings of children for learning experiences must, therefore, be informal, flexible, and frequently changing, and they must provide for individual variations within the groups.

This of course does not mean that there should not be group activities or activities by a whole class, or even by a whole school. People with widely different backgrounds and ideas and abilities may, and throughout life do, work together, play together, and contribute to each other's thought, experience, and happiness. In any sort of activity where we are willing to have widely differing outcomes among the members of a group, we need not be overconcerned with the differences in development and interests that exist among the members of the group. But when there is something that each person needs to know, or understand, or be able to do; when there is some sort of common standard, as in the ability to add correctly, or the recognition that Caesar and Shakespeare were different people at a different time and in different parts of the world, standing for different things; or the understanding of the need for quarantine, then the teacher who is trying to guide the child to a realization of his need and to its satisfaction must reckon fully with the child's developmental readiness for this learning. This calls for a real adaptation to individual differences, an adaptation of method, of material, and of time of presentation, to the developmental and experiential readiness of each child.

Often such adaptation can be, to a considerable extent, achieved through flexible, temporary, informal groupings of children. Sometimes, particularly in helping children to the mastery of a skill, it calls for an organization that allows each child to work by himself on the particular elements where he needs practice. People playing in an ensemble or orchestra gain certain things by playing together, yet need to practice in sections at other times and even to work individually on specific problems of their own. In like manner, children in achieving an academic skill, such as the reading or writing of a foreign language, or the mastery of a scientific technique, or the learning of long division, need to have opportunities to work individually as well as in small groups, and yet can gain certain advantages in large group enterprises.

where there is interrelation of their individual skill with the skills of many of their fellows.

III. SOME INSTRUCTIONAL AND ADMINISTRATIVE DIFFICULTIES

In one sense, to take account of child development adds tremendously to the work and responsibility of the teacher. No longer does she merely need to know her subject matter and some good general methods and texts. Instead, she needs to know as much as she can possibly learn about each child whom she is trying to guide, about his physical maturity, his mental development, his past experiences, his interests and his needs, and the demands society is going to make upon him. She needs to have a type of class organization that provides for individual work, for small flexible groups, each carrying on more or less independently of others, and for class activities that make the variety of experiences and developmental levels in her room a stimulating and enlarging factor in the children's lives. The teacher's knowledge, resourcefulness, energy, and insight are called upon to the utmost. Many administrators, indeed, will be tempted to say that fitting the curriculum to child development calls for super-teachers, that it cannot be done by the average teacher in the average school.

But great as the difficulties are in the way of making a curriculum a function of child development, the difficulties of ignoring child development in the attempt to educate children are greater. When a teacher attempts to give all children, regardless of their development and their experience, a fixed body of subject matter, she attempts the impossible. She can go through certain pedagogical motions; she can maintain an external semblance of order; most of her children will learn something; but she is bound to fail to achieve the thing she attempts; that is, to bring all children up to a given standard of proficiency in all subjects. Meanwhile, in her ignoring of the children's readiness, in her attempts to force unassimilable material down unwilling throats, she is liable to destroy children's appetites for learning and to make the child's school life into a dreary routine.

By failing to take full cognizance of child development, a teacher loses the greatest stimulus to her own growth and development. But when a teacher attempts really to understand the children she is working with, really to make the curriculum an integral part of each child's developmental processes, even though her knowledge and her skill are sadly inadequate, she will tend to develop with the children, and she will come increasingly closer to success, as does anyone who attempts to work with, and not against, nature.

SECTION III

APPRAISAL OF OUR KNOWLEDGE OF THE RELATION OF THE
CURRICULUM TO CHILD DEVELOPMENT AND OF OUR
METHODS OF INVESTIGATING THE PROBLEM

CHAPTER XX

PROBLEMS OF METHOD IN MATURITY AND CURRICULAR STUDIES

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I. PRELIMINARY CONSIDERATIONS

Our whole view of the complex subject of this chapter will be clarified if we constantly bear in mind the fact that *every curriculum and every placement of subject matter represents a compromise between the child's abilities and interests and the demands of society*. At an age when he is, perhaps, but poorly equipped for the material he is required to master, a child may have to learn some things that will make him function more efficiently in the surroundings in which he finds himself at the moment or will find himself later.

This is not to say that practical considerations have been or should be our only guide in planning the school curriculum. Research has, in the immediate past, served greatly to modify the nature and placement of curriculum material, and it will continue to do so, to the advantage of both the individual child and the society to which he belongs. We must not, however, so magnify the value of research — particularly of isolated or theoretical studies — that we ignore the practical conditions under which teaching is done. The modern teacher, like the modern physician, needs to keep in touch with both research and practice.

In the past the location of curricular material has been determined partially by the logical arrangement of the subject matter and partially by *a priori* assumptions as to what should or should not be taught. The naive approach to instruction was to break material up into the smallest units, from which progress was then made to larger and more complex units. Thus, addition tended to be taught before subtraction, and both addition and subtraction before multiplication and division. In teaching languages, vocabulary and rules of grammar were placed ahead of reading and composition. In reading, letters

were taught before words and words before sentences. Oral reading tended to come ahead of silent reading and spelling was emphasized before much reading was done.

Over many centuries, the placement of such material has been modified in some degree by the practical experience of teachers. But until empirical and inductive modes of thought replaced the deductive tradition, custom determined the placement of material, and the experience of teachers counted for little.

With the introduction of research techniques and scientific thought, numerous studies of the placement of curricular material were undertaken. But such studies always start in a social framework that has been developed over many centuries and within which the essential elements and order of the curriculum have already been laid down and customs have built up prejudices with respect to certain types of material and certain modes of presentation. These are handed on from the teacher to the student, who in turn becomes a teacher and perpetuates the traditions. The student of curricular placement thus moves, not into a free environment in which his experiments are unaffected by what has preceded, but into a relatively rigid situation in which the problems, although seemingly simple when viewed in the abstract, may be actually very difficult.

Research has made it clear that this 'logical' arrangement of subject matter is not always the most effective one and that mere practice in a simple function is not always favorable in its effects on a more complex one. Instruction in small units may set up habits that interfere with subsequent progress when larger and more complex units are encountered. The old-fashioned 'copy book' forced many children to practice their errors almost as much as their correct performance. Too much instruction in oral reading may interfere with the acquisition of skill in silent reading. Emphasis upon addition and subtraction may make multiplication and division harder rather than easier. Modern thinking is, therefore, characterized more and more by a psychological, rather than by a logical, approach.

Then, too, while many materials lend themselves to a logical order, the problem of the most effective presentation still remains. Placing the child in meaningful and whole situations closely related to his needs may, as the results of some studies show, bring about much more effective acquisition than the extreme division of subject matter into its logical units.

Effective research likewise is a matter not of single isolated experiments, but of whole groups of investigations carried on in many places

and by many individuals. The results of these studies progressively modify points of view and bring increasingly clearer insight into the essential problems of the relation and arrangement of material. Modern studies not only reveal the inadequacy of *a priori* assumptions in regard to the placement of materials, but they also show an intimate relationship between placement and methods, and a gradual modification of the difficulty of material as the underlying concepts become generally familiar through incidental practice and day-by-day use. Many of the mathematical processes, for instance, that are commonplace today, were at the time of their derivation among the most difficult concepts that man has evolved. Sometimes, through the widespread social usage of particular concepts or materials, the appropriate grade- or age-placement of material may change to a marked degree within a single generation. Even casual observation reveals that children of the present generation are familiar with, and discuss freely, many ideas that in earlier generations were treated only by adults, and then by only a few adults.

When we speak, then, of curricular research, we speak of a process of thinking and of systematic investigation in the placement of school material that will go on indefinitely and that will result in an ever-changing series of modifications and adjustments. One of the greatest contributions made by research is the freeing of thought from the rigidities imposed upon it by tradition and custom. While formerly it was held that a series of absolutes could be determined, now it is becoming clear that all our findings are relative to the framework in which the child is located. Absolute concepts are more satisfying to many individuals, but the day is gone when they can be retained in the face of the growing mass of experiment and observation relating to the curriculum. It may well be that all curricula must be regarded as experimental rather than as final. The scientist is interested in discovering, through an empirical approach, the relations that exist in concrete masses of data and, through a rational approach, the general principles under which wide reaches of empirical data can be subsumed. The striking departure from earlier methods is found, not so much in the generality of the assumptions made, as in the fact that they start from systematically observed and recorded data, instead of from haphazard observation and untested theories.

II. TYPES OF CURRICULAR MATERIAL

The content of the school curriculum may be divided into two broad classes of material. The first involves skills and knowledge that are

acquired through specific practice, such as reading, arithmetical computation, playing the piano, the facts of history, and so forth; the second involves general complexes of skills, knowledge, attitudes, appreciation, and understanding, which are gradually fixed through the child's experience. An instance is furnished by dramatics. The spontaneous dramatic play of the four-year-old is gradually superseded by participation in school dramatics. In time there appear a finer appreciation and a higher level of performance, which culminate in the outstanding dramatic accomplishments of some older children.

When the environment is pervaded by stimulation, the normal child cannot help acquiring appreciation and understanding of certain skills. With the present increasing emphasis upon dramatic art in the motion pictures and in radio, for instance, even comparatively young children now have a conception of the dramatic possibilities in play situations that children of earlier decades did not have. The development of such appreciation and understanding varies markedly, of course, with the cultural background. In one school in which dramatic performances are encouraged, seven- and eight-year-old children may be doing as well as ten- or eleven-year-old children in another school in which there is little encouragement. In one community, too, the religious, social, or political attitudes of children, like those of adults, may differ widely from the attitudes in another community. At one period of history the appreciation of art or of literature may vary greatly from that at another. Children from some homes have a high degree, and those from others have a very low degree, of intellectual and cultural interests. Even skills are markedly influenced by the cultural background. Witness, for instance, the modern child's practical knowledge of automobiles and his ignorance of the ways of horses.

In some degree the extent of children's appreciation and understanding can be measured by studying the development of their concepts. Such studies show wide variation from one environment to another. The development of concepts is so tied in with a multiplicity of other factors that no single nodal point can be established. But children's levels of response can be substantially improved by appropriate instruction, experience, and emphasis, or be set back by their lack.

In a recent study of the development of children's concepts made by Deutsche (3), it is reported that American children give many more naturalistic, mechanistic, and scientific explanations of phenomena than do European children, who tend to make animistic and spiritistic

explanations of similar phenomena. One reason for this may be that our machine-made and scientific culture surrounds the American child from earliest infancy to a much greater degree than is true of the European.

The age-progression curves in children's concepts show slight but steady improvement in the type of explanations offered as the child grows older, although some six- or seven-year-old children show more scientific reasoning and a more logical approach than do some sixteen-year-olds. There is, then, no specific point at which understanding can be said to have begun and no points at which it ceases to increase. If, on the basis of the Deutsche and similar studies, one were to ask at what point scientific experiments, demonstrations, and causal explanations of natural phenomena should be introduced into the curriculum, the answer would be "at every point." All that can be said is that concepts must be presented in somewhat simpler form to younger children. As the children grow older, more complex demonstrations can be made and more complicated phenomena analyzed.

This brings clearly into the forefront of the problem the question of materials and methods. We can generalize this aspect of the problem by stating that the materials and methods appropriate for teaching younger children may be different from those for older children and adolescents, and that those suitable for children may differ from those used for adults.

Perhaps it would be well, then, to restate the problem of the relation between the curriculum and development by throwing the emphasis, not upon determining the location of particular skills in terms of age or maturity, but upon determining the methods and materials that are best adapted for teaching these skills at various age levels. Such a view of curriculum-building would place the emphasis, in the selection of content and skills, upon the demands of the child's environment, and lead to research on the adaptation of materials and techniques to the level of development that he has reached. For instance, since children living in an age of automobile traffic need to know how to cross streets and protect themselves, we do not ask the question, "Can the child at four years acquire these contents and skills?" but rather, "How, in view of the necessity of the skill (as determined by other values) can we set the stage and motivate the child so that these contents and skills will inevitably be acquired?"

This method of curriculum-building would be much facilitated if it were possible to make an inventory of the skills, subject matter, and

attitudes necessary for the adaptation of the child and the adult to the modern world. Unfortunately, however, no complete or permanent inventory can be made because of the continual shift in the demands of living. Even if such an inventory could be made now, it is probable that within a relatively short time its application would result in precisely the same errors that have arisen in formal education, because a program outlined in terms of one generation might not meet the changed situations faced by the next.

III. THE EXPERIMENTAL APPROACH IN THEORY AND IN PRACTICE

1. The Ideal Experiment

Ideally, it should be possible to set up experiments to determine the placement of curricular material both for unit skills and for larger configurations. But there are relatively few well-controlled experiments that set out specifically to determine the maturity level at which skills can be acquired under practical conditions. There is also some question whether any single experiment or set of experiments could solve the basic problems involved. It is very difficult to set up a group of older and of younger children who can be taught the same skill under the same conditions and with the same methods and motivation, in order that direct comparison may be made of their progress. If a group of five-year-old children, a group of seven-year-olds, and a group of nine-year-olds could be sampled from the general population in precisely the same way, if they could be placed under a similar instructional program, and if their relative progress could be compared, not only in terms of the group as a whole, but also in terms of the individual children who made up the groups, then reasonably clear data with respect to one type of material or one method of instruction might be obtained. If such an experiment were done with reading, for instance, it might be possible to answer more precisely questions concerning the placement of reading in the curriculum. But in evaluating the present literature, one must compare a reading experiment done in one school under one method at a particular age-level, with another done in a different school under a different method at a similar or a different age-level. Only by making the material and the method of instruction constant, by equating the background of the children by controlled sampling, and then by varying age, can accurate data be obtained.

A more nearly perfect experiment would be one in which a series of groups of children, say three groups at the age of five years, three at the age of seven, and three at the age of nine, again selected so as to be

equivalent samples from the general population, were taught by methods A, B, C, or by materials A, B, C. If the results of such an experiment were available, not only could a determination of the appropriate age at which to begin instruction in reading be made, but the relation between age and the method of instruction or the types of material used would also become clear.

2. Discordant Results

Even a cursory examination of the present literature shows wide disagreement in the results presented in the several studies. In many instances these discrepancies arise either because of variations in methods or materials that are not adequately described or because of the limited range of the experiment. An investigation of the type described, which would involve controlled variations in age, in materials, and in methods, and which would cover an age range of fair extent, would clarify our knowledge of the entire series of relations, because of the many intercomparisons that could be made between the sub-groupings. It would be an extension of the control, or matched, group technique so widely used in modern educational experiments.

3. Adequacy of the Control-Group Technique

The control-group technique grew out of the attempts of scientists working in the psychological and social fields to reproduce the conditions that hold in experiments in the physical sciences, in which all factors save one are controlled and the effects of the one that is permitted to vary are determined. Recently Fisher (4, 5) has raised important questions as to the adequacy of such techniques in the biological and social fields and has worked out methods for planning experiments in which many factors are permitted to vary and small samples that meet various criteria are so chosen that a complete analysis of the relative contribution of each factor can be determined by means of the variance techniques. These methods, developed for the lay-out of agricultural plots, have been applied in only limited fashion within the educational field; but they offer a promising mode of attack on many curricular and educational problems, especially when data on large numbers of cases are available and small samples can be drawn from the total population to meet criteria laid down in advance in accordance with the design of the experiment. In the future, much more attention will be given to the design of the experiments and less to the mere accumulation of statistical material without reference to sampling.

4. General Applicability and Relation to Other Educational Features Must Be Kept in Mind

In any valid experiment the methods and materials developed must be tried in a number of schoolrooms, with different teachers, under ordinary working conditions. The proponent of a new method of technique is far too often like an evangelist in his fervor. He motivates children so highly that they achieve astounding results that cannot later be duplicated by others. The test of a method of instruction and of an educational material, as of a scientific procedure, is to be found not in its own uniqueness, but in the possibility of its reproduction with similar results by others.

An ideal experiment to locate curricular material would not only be a very expensive procedure, but would also involve a control of teaching conditions and school routine that can be attained only rarely in the actual school situation. And no matter how ideally the experiment was set up, it would not answer the practical question as to the placement of a skill or an instructional program in relation to other features of the educational process. Suppose a study on eight-, ten-, and twelve-year-old children with no previous instruction in reading showed that the ten-year-old children could learn to read in half the time taken by the eight-year-olds, and that the twelve-year-olds could learn in half the time taken by the ten-year-olds, or in a quarter of the time taken by the eight-year-olds. Would such findings determine the placement of reading instruction in the curriculum? Not necessarily, because it might still be advisable to teach reading to eight-year-old children because of other needs, even though they cannot learn as quickly as ten- or twelve-year-old children. For a child who learns to read at eight and uses the skill during the next four years will acquire a mastery of content in other fields for which reading is a tool that the child starting at twelve would fail to acquire. Ease of acquisition of a skill is not, then, the only criterion for the grade-placement of subject matter. The use of this criterion, however, throws new light on the entire educational process and furnishes important grist for the mill of curriculum-making.

Even though an experiment would determine the points on the developmental curve at which, from the standpoint of ease of learning, instruction might well be given, it would not determine whether or not the particular skill was of any importance in relation to other skills. Suppose an experiment in spelling showed a specific development or

grade location for a group of words. It would still be possible that a more comprehensive investigation, carried out over a longer period of time, would reveal that there was no necessity whatever for instruction in spelling. Suppose one group of children were carried from Grades I to VI with instruction in both reading and spelling, and a second group with instruction in reading only, covering the time normally spent by the first group in spelling and reading. If at the end of the sixth grade it were found that both groups spelled equally well, it would be clear that the instruction given in spelling was wasted, in spite of the fact that its grade location had been determined with reasonable accuracy by other specific experiments.

5. The Complexity of the Experimental Problem

The task of moving into the complex of factors that make up the development and education of children and of determining precisely what they should or should not have at given periods is, then, of very great magnitude, when considered either from the point of view of the development of the child or from the point of view of curricular content.

In the first approaches to the problem of placement, attempts were made to determine the grade-location of materials. Since grade-location in a relatively inflexible school system is intimately tied in with chronological age, this involved an indirect determination of what children at various ages could do. As research continued, it became clear that children within the same grade or of the same age vary greatly in physical development and mental maturity. In addition to information on grade-location, studies then began to include information on the mental ages of the children. More recently it has become evident that there is also an intimate relation between the experiential background of the child and the readiness with which he acquires particular material. Thus what seemed to be a simple problem, from the point of view of the child's development, has become a very complex one, and we now think in terms of multiple, rather than of single, factors as determiners of placement.

A similar course of events has been followed in the studies of content. At first subject matter was looked upon in terms of fixed units. Then it became clear that shifts in methods of instruction, in the arrangement of subject matter, in the type of materials, and in the methods of motivating children produced marked variations in the relations between units. More recently it has become apparent that a distinction must be made between general material that can be introduced in-

formally into the environment of the child in preparation for later systematic work, and the systematic work that is to be introduced at a specific point in the curriculum. For instance, children have been known to acquire a high level of skill in arithmetical processes by playing rummy for a period of months or years without any thought that practice in arithmetical operations was involved. It is possible that the relation between the location of readiness material and the location of systematic practice varies for each subject-matter field or skill and needs special investigation. Thus, even though systematic practice may prove to be more efficient than incidental practice at one level, it does not follow that this relationship will hold throughout all developmental levels. We then become interested not so much in the effectiveness of a teaching method or of a material *per se*, but in the relation of method and material to developmental level.

How shall the effectiveness of a particular part of the curriculum or of the curriculum as a whole be measured? To a very large degree current studies rely on tests of knowledge or skill given immediately or a short interval after the child has completed the particular content. But our attention should be directed to the more permanent and lasting effects of education.

IV. GENERAL CRITERIA FOR THE EFFECTIVENESS OF A CURRICULUM

The more general criteria for the effectiveness of curricular content are to be found in the following: First, the effects of the content upon the subsequent behavior of the children exposed to it. (Do they use the material and skills in their everyday contact with life, do they continue to read, discuss, and work with the material presented and the skills acquired?) Second, the retention of the materials and skills presented. (How long does the effect of any particular content or skill remain a part of their equipment?) Education is for a long, rather than a short time, and those phases of the educational process that permanently modify and change modes of behavior are more significant than those that produce marked but temporary modifications. Third, the changes in attitudes, points of view, and philosophy of life resulting from the educational process; *i.e.*, as distinct from overt behavior, those experiences that change the direction or integration of whole groups of skills and attitudes.

Closely related to the problem of retention is the ease with which the child or the adult can reinstate a previous level of knowledge or skill when occasion arises. Not all the content that is given the child

can be maintained permanently at the level at which his formal education ceases. But if some of it remains, and the child or the adult knows where and how to secure the information, knowledge, or skill he wishes, and if he has built up confidence in his capacity to master it, his education has been effective. Related both to the factor of retention or reinstatement of educational content and to the factor of modifying attitudes and changing points of view is what may be called the 'sensitizing effect' of education; *i.e.*, making the child or the adult aware of his own potentialities and building up in him both a sense of direction and a knowledge of the how and why of particular skills, abilities, and attitudes. Thus, the study of mathematics may make the child aware of the methods of solving problems that would be extraordinarily complex without mathematics and lead him on in his control over himself and his environment; again, the study of music may lead to much incidental practice and the acquisition of skills and interests of great personal and recreational value; likewise, the study of the social sciences may make the child and the adult more alert to what is happening about him and more effective as a citizen in his relations with the state and community.

But if these are the broad effects of education and our measurement studies and devices are weighed against them, it becomes clear that, while much progress has been made in the measurement of educational methods and procedures from a temporary and restricted point of view, we have not as yet succeeded in developing the techniques for their evaluation on a larger and more general basis. Obviously, in addition to the many studies that have been, and are being, made on children who have been exposed to educational procedures for one or two, or even five, years, we need studies, carried on into early and middle adult life, of the effects of particular curricula and educational programs. Here the problems of sampling, of control, and of measurement become of even greater complexity than in the studies made at particular levels of childhood or adolescence. But with the widespread use of measurement devices and the testing of large numbers of children periodically, it is only a question of time until the adult behavior of those who have been exposed to our educational program can be evaluated with adequate statistical controls. What for instance, with intelligence and socio-economic background controlled, will be the accomplishment in adult life of children exposed throughout their school life to a traditional curriculum, as compared with those who have been exposed to a modern activity or project curriculum?

But these are general questions that must wait for their answers until very broadly conceived and very well-integrated blocks of experimentation can be done. In the meantime, we must be content with alternative methods that supply us with some practical data in the light of our own cultural and social framework. But before presenting these, a brief summary of the difficulties or limitations of present curricular research, some of which have been already implied or suggested, will be considered.

V. DIFFICULTIES OF CURRICULAR RESEARCH

1. Inadequacy of Intensive Experiments on Single Skills Conducted for Theoretical Purposes

A clear distinction must be made between those investigations conducted for theoretical purposes in order to determine how early in the developmental period a particular skill or activity can be acquired and those that are concerned with the acquisition of skills under actual schoolroom conditions. Many of the former type of investigations are made under optimal conditions with intensive work on an individual child continued over a long period of time. It would be impossible for a teacher with a group of children or for an educational organization to carry forward such early and intensive training for all children. The recent McGraw investigation (7) demonstrated that infants can acquire fairly complex motor skills when an appropriate environment is set up. But the practical problem is that of determining the age or period at which skills can be learned by groups of children under typical classroom conditions when a number of other skills are being acquired simultaneously with the skill in question.

Many experiments also deal with skills that are so abstract and remote from everyday life that they have little or no relation to the practical school situation.

2. Inadequacy of Studies on Small Segments or Units of Skills or Subject Matter

Many of the research data available on the curriculum consist of isolated or small segments of problems attacked by students working for a master's or a doctor's degree. They differ widely in the materials and methods used, the age ranges covered, and the samples of children studied. In many instances, the descriptions of the materials and methods are so inadequate that the experiments cannot be repeated or checked and often the results are so inadequately presented that they

cannot be compared with those from other studies. Many studies, for instance, break down their data in terms of grade location, without presenting corresponding data on chronological or mental ages. Often many of the statistical constants necessary for interpreting the data are omitted. It would be well if some agreement could be reached as to the basic or minimal data that should be presented in order to describe the sampling of children and the results obtained.

While these limited studies are of great value in exploring the field, continuous research in a context over a long period of time possesses decided advantages over the isolated and unrelated studies. The work of the Committee of Seven in mathematics is a striking example of work continued for a long period of time. When research is thus carried forward, it is clear that the task of evaluation is never complete and that educational problems are seldom solved as definitely and permanently as many of the more limited studies seem to indicate.

The determination of the relation of a unit skill and the appropriate time for teaching it differs from that of placing a whole series of inter-related skills. It is quite possible that, even if the location of the components of a subject-matter field were determined with great accuracy, the ideal level for locating larger configurations or the entire field would still have to be determined by investigation on a large scale.

3. Inadequacy of Studies Because of Failure to Recognize Wide Variations in Abilities in the Practical Teaching Situation

Many studies have used small homogeneous groups of children that have been rather carefully selected. The conclusions reached hold for such groups of children, but in the actual schoolroom under practical conditions there is likely to be a variation of as much as four years in chronological age and of as much as six years in mental age. If this is generally characteristic, it is clear that principles of absolute grade or developmental location will not hold. Rather, we must think in terms of a range of material that will meet the needs, interests, and developmental levels of children who vary widely.

4. Inadequacy of Application Because of Varying Motivation in Experimental and Practical Situations

The practical application of methods or materials may fail in spite of the validity of the experiments determining their location, because, in their use, the new methods or materials may become so routine and automatic that the children lose interest. Because both teachers and

students realize that an experiment is being conducted, motivation is often much higher in experiments than it is in the later practical application of the new methods or materials. What we should seek in investigations, then, is the discovery of the underlying principles that determine the location of the materials and methods. Then we could acquaint teachers and administrators with those principles. Some degree of freedom should be left in the matter of practical application. Any method that fails to take account of motivation and interest may prove to be inadequate. Mere mechanical reform of techniques, no matter how exact, may defeat the very purposes for which the techniques were developed.

5. Inadequacy Because of Concern with Proof or Statistical Techniques Rather than with Discovery

In discussing research techniques, a distinction may be made between two phases of the research process. Research is first of all concerned with the discovery of new hypotheses, principles, or facts, and secondly with the proof or demonstration of their validity. Many investigators confuse the first step with the second and become so concerned with the minutiae of technique that they attack trivial rather than significant problems. As a result many studies, however perfect from the statistical point of view, are psychologically superficial and add little or nothing to our insight. Often the greatest progress in science is made by those who approach major problems flexibly and leave the later verification of the principles to a more precise approach. In the field of educational research there seem to be many who are less concerned with discovery than with the painful elaboration of minute or insignificant data. This is not an attack upon the use of statistical methods, but rather a plea for their meaningful use and effective interpretation.

VI. CRITERIA FOR THE EVALUATION OF CURRICULAR STUDIES

The following are criteria for the criticism and evaluation of studies of the placement of curricular materials:

1. Does the study attack a significant problem? Is it so designed that it will produce meaningful results and enable the relative weight of the various factors to be determined? Is an hypothesis set up that may be supported or refuted on the basis of the data collected? Or, if it is a normative or survey study, have adequate precautions been taken to insure that the final results will be of value in understanding

children? Has sufficient account been taken of the interrelation of skills and of the configurations in which learning actually takes place, so that this study will contribute to our understanding of the whole?

2. Has the investigation been carried out on children of different grade levels, or of different chronological ages, or of different mental ages? Have the results been presented in such a way that the trends with school grade, with chronological age, and with mental age, or any combination of these, can be determined?

3. Has a sample of children been used that is both adequate in size and typical in its selection? If not, is the description of the sampling of children presented in such a way that the results may be interpreted in the light of the sampling or compared with other studies? Does the description of the sample include at least chronological ages, mental ages, sex, grade location, and socio-economic status?

4. In investigations with control groups, has the sampling of children in both the control and the experimental groups been similar? Are the characteristics of the pairing or sampling procedure with reference to such factors as sex, age, socio-economic status, mental age, and school history adequately presented?

5. Has the motivation of the children in the special group under consideration been controlled, or, in case a control group was used, has the motivation been constant for both groups? Where there is a question of motivation, has the procedure been tried later on a different group?

6. Have the prerequisites of the skill in question been determined, including the effects upon it of incidental practice and of indirect stimulation? Are measures available of the information and skill level of the children prior to the experiment?

7. Have valid and reliable measurements of the skill in question and of related skills been made at the beginning and at the end of the practice period? Have such measurements been made after a period of time, in order to determine the permanence of effects and the amount of review or practice necessary to reestablish former levels of skill?

8. Where the same experiments are conducted at different age levels, has the time factor or the amount of practice been controlled? When, for instance, children eight years old are compared with six-year-olds in the learning of reading, is a careful check made of the amount of time that both groups of children spend, either formally or incidentally, at reading?

9. When a norm has been established, has the question been an-

swered as to how this norm is affected when the time of practice is kept constant and the method or materials varied, or the method or materials kept constant and the time varied? In other words, how do the norms obtained vary with various factors?

The need of well-formulated and carefully executed experiments on the placement of curricular material in relation to the development of the child has already been stressed. In the last three decades there have been steady improvement in techniques, more insight into the essential problems, and more studies undertaken on a wide and comprehensive basis. If one is discouraged with what seem to be the meager outcomes, he should compare a present-day standard text on the curriculum, on child development, or on teaching methods with a standard text of the period of 1910.

VII. OTHER TECHNIQUES FOR CURRICULAR RESEARCH

Not all the progress has come through the use of pure experimental techniques; much of it has come through alternative techniques, which will continue to supplement the more adequately controlled investigations and give us additional data. These may be listed as follows:

1. Normative Studies and Surveys

Under this head are included a wide range of developmental studies covering both such basic processes as physical growth, intelligence, memory, attention span, and reaction time, and such outcomes of experience as range of information, concepts of time, space, and number, reading skill at various ages, and so forth. Many of the studies upon which Chapter I of this Yearbook is based fall under this heading.

Unfortunately, many of these studies cover a limited age range and do not interlock with studies at higher or at lower age levels. With the increasing interest in the development process, investigations are being extended to wider age ranges, and excellent longitudinal studies, which promise to add much to our knowledge, are supplementing or replacing the cross-sectional ones upon which so much of the literature is based. While many of the developmental studies do not directly concern educational processes, all have some indirect relation and all furnish material with which the curriculum-maker should be familiar.

While the extent to which many of these processes are related to the cultural and social background is not known, nevertheless, if normative or developmental studies and surveys using similar methods could be made from time to time, it would be possible through intercom-

parisons to obtain data that would reveal the changes in cultural background.

Various modifications or modes of analysis that are of value for the understanding of placement can be introduced into normative or developmental surveys. One very valuable method arises through the comparison of the performances of bright and of dull children of the same M.A. on similar items or fields. Since chronological age varies widely in such a comparison, a determination can be made of those factors that are closely related to chronological maturity or experience as distinct from mental maturity. In some fields of learning the acquisition of subject matter may be tied in more closely with experience than with brightness.

Developmental or normative studies are of distinct value in determining the readiness of children for instruction, as well as for indicating the appropriate time for systematic practice. Thus, studies of the range of information among kindergarten children that revealed decided lacks in their home experience have guided the kindergartens into discussions of common everyday objects instead of topics remote from everyday life, with the result that the children attain greater readiness for reading instruction before they enter the first grade. Studies of vocabulary development have led to modifications in the preparation of textbooks and in adaptation of content to the child's level. Unless normative or developmental studies are undertaken from time to time, the educational process, because of a general tendency to complicate instructional material as experience is gained, is likely to become 'high-brow' and far removed from the needs of children.

2. The Determination of the Interests and the Spontaneous Activities of Children

In many modern educational programs, emphasis is placed upon the so-called 'natural,' spontaneous interests and activities of children as the base upon which to begin the educational process. Longitudinal studies of the same children over a period of years and cross-sectional studies over a wide age range show decided age trends. Some interests have a high degree of stability in so far as age location is concerned, while others are markedly influenced by the social and cultural background. The Lehman and Witty (6) repetition, after an interval of thirty years, of Burk's (1) study of children's collections, reveals an amazing change in the number and proportion of children who are making collections, and shows that specific interests are influenced by the

general social and cultural context. But there are other activities, such as jumping rope, that seem to have persisted, in spite of cultural changes, in generation after generation of six-, seven-, and eight-year-old children. Social convention and tradition affect not only the time of onset of interests and activities, but also the point at which they cease. Thus many games and activities disappear because social pressure says they are 'kid stuff,' yet actually adults and older children play these games with much zest when given free opportunities unhampered by social convention.

The question arises, then, whether or not any given general determination of interests and spontaneous reactions applies also to smaller and restricted groups or to children of other cultural levels or educational backgrounds. There seem to be very few absolutely 'spontaneous' or 'natural' interests that retain their original quality in spite of cultural factors, but there are many apparently spontaneous interests and reactions that are determined by example, by the enthusiasm of the child's associates, or by the attitudes of parents, teachers, and others. Hence, it is quite possible that effective guidance and the use of clever techniques for motivating the child may be more influential than any reliance upon a categorically outlined series of interests and spontaneous reactions.

In the determination of children's interests, particular account should be taken of their activities when not under school domination. The activities of children in their free time may be a better guide than those in a teacher-guided situation. In that connection, many of the interest studies have taken the form of questionnaires, in which children have answered questions as to the games or activities in which they are interested; but since there is always a question how well verbal responses reveal actual conduct, it would be well if such questionnaire studies could be supplemented by observational studies that record the amount of time spent in activities when facilities are available. For instance, a child who says he is interested in chess may play only one game a year, while another who gives the same answer may play four or five hours a week.

An investigation of much theoretical and practical significance would be one in which two school systems with radically different curricula were studied, so as to compare children's interests and spontaneous activities over a wide age range. If such a study were broadly conceived and took account both of children's leisure activities and of their expressed interests, it might provide some data on the effectiveness of the curriculum as a whole.

3. Periodic Tests of Educational Progress

We refer here to periodic measures of the performances of children at various age and grade levels by means of standardized tests and measures. Such a testing program will afford some evaluation of the location of the curricular materials already in use. Thus it may show the successes or failures in the general teaching program for a school. If the children in one room fall very low while the children in corresponding rooms are high or average, some expert investigation of the quality of the teaching or the sampling of the children in the low room needs to be made. If all the children in a grade make unexpectedly high or low scores, further study of curricular placement is indicated.

The practical value of periodic tests of progress is great, not only for modifying teaching techniques but also for furnishing data on grade-placement by using the resultant accumulation of an objective body of knowledge for curricular revision. Such tests are far superior to impressions or 'hunches' about educational materials and processes. However, the application of the results to other school systems in different areas assumes a consistency of method and material that may or may not exist. But even this application may improve the educational process in those school systems, if it does not lead to such mechanical standardization of methods, materials, and processes that effective motivation and adaptation of content to the needs of individual children are lost.

The process of testing educational outcomes within a school system can be facilitated if occasional experiments are done on a fundamental larger issue, using control techniques and seeking data that will obtain the answer to specific questions or confirm or deny certain hypotheses. Research departments in city school systems have excellent opportunities to carry on such investigations, using modern techniques, such as the control group, the matched group, and small-sample methods described by Fisher (4, 5). Unfortunately, however, in many instances the possibilities of these techniques are not realized because of the concern of the research department with narrow practical interests rather than with fundamental principles.

4. Specific Studies of Contents, Processes, and Materials in Terms of Difficulty, Errors Made, and So Forth

For many subjects it is possible to determine the relative difficulty of the various components of the content taught. Numerous methods are available for determining difficulty, such as the ease of acquisition,

the frequency of use after acquisition, the number of errors made, and so forth. Of these, perhaps the number of errors has been the most widely used. The basic assumption is that if many errors are made, the material is placed too low, but if very few are made, too high. It is obvious that any extensive study of children's errors has great value in locating the points at which the quality of teaching should be improved or its emphasis or stresses changed. It is foolish to let children practice over and over again what they already do without error and to neglect work on which they make many errors or with which they have had little or no acquaintance. In the determination of errors, however, some account must be taken of the fact that the errors made by children may not always be 'errors' in the adult sense. An example is furnished by children's drawing. During the early school years the child is not drawing what he sees but what he knows. And it is possible that too great emphasis upon errors at this time may tend to destroy his motivation for drawing rather than to correct his errors, many of which would disappear with maturation.

This method is subject to the further criticism that the difficulty or ease of a particular item may have no significant relation to its social usefulness. Thus the word *refrigerator*, either on *a priori* grounds or on the basis of observation, may be regarded as difficult, yet it may be learned by two- or three-year-old children because that particular article of furniture is present in the home and elicits constant reference. The word *lay* as a substitute for the word *lie* is, according to the Davis investigation (2), used by 100 percent of nine and one-half year-old children, irrespective of their socio-economic status and educational background. Despite the brevity of these two verbs and the ease with which they are acquired, they present extraordinary difficulties. Under our present social arrangement, it appears necessary to teach the distinction between them. But the distinction is probably useless and will disappear in time through the overwhelming confusion that it causes for both adults and children.

The determination of the difficulty of items, processes, and materials and the modification of the curriculum in accordance with such findings may in time present serious difficulties — so far as the general outcome of the educational process is concerned — because the performance of the typical, or average, child becomes the critical base, so that the placement of given subject matter may be pushed higher and higher up in its grade and its age location, probably with a concomitant, progressive degradation of the levels of instruction and certainly with marked in-

adequacies of the curriculum for the abler pupils. It is important to recognize the tendency toward oversimplification that appears when we follow the criterion of ease of acquisition, and to encourage experiments that will show how the more intrinsically difficult material can be presented in such a way that it may be grasped by children at lower levels. There are obvious advantages in preparing a textbook or a series of working exercises that proceed from the simple to the complex and that carry the child into the learning process by easy stages with high interest. But we must not, as so often happens, be satisfied with a superficial acquaintance with easy materials and so neglect experimenting with methods of introducing more difficult materials. It smacks of undesirable complacency to meet every difficulty that appears in the acquisition of material by merely deferring it to a higher grade level.

5. The Determination of Present or Future Needs and Environmental Demands

Much of the content of the curriculum is determined by the needs of adult life and the environmental demands imposed by our culture. As was said at the beginning of this chapter, in a very real sense every curriculum and every placement of subject matter represents a compromise between the child's needs and interests and social demand. While an individual teacher may feel it is unwise to teach a particular child to read at a particular level, nevertheless she must do so because some reading skill is required for work in higher grades and ultimately for adapting to our society. If, therefore, a series of studies could be undertaken that would set out explicitly to determine what adults and older children do, how they spend their time, what activities are essential to their adjustment, and what specific skills they need, such a series might help greatly in setting up the curriculum. A number of studies of this type have already been undertaken and more are under way. They have resulted in the elimination of some useless material from the school program and the inclusion of material directly related to later needs. For example, at the present time, courses in family life and child-rearing are coming into the curriculum in many school systems because 90 percent of all children who go to school will ultimately have some responsibility for their own children.

A specific example of the approach through needs is to be found in the studies of mortality, morbidity, and accident statistics of children at various age levels. On the basis of these figures specific instructional material can be inserted in the school curriculum at a time when it will

protect children and reduce accidents and illness. If the need is admitted, the question that is raised is not "Shall this be or not be taught at this age level?" but "How can this material be adapted to children at this age level?" This transfers the problem from the field of placement to the field of method. Some skills, chiefly those directly concerned with the safety of the child, should be acquired as early as possible, regardless of ease of learning or of child interest. And much expenditure of time in such instruction would be justified in view of the very great value of the skills.

In some individual cases, the selection of skills for instruction may depend upon considerations other than placement in relation to developmental level. It may be necessary, at some cost of time and effort, to instruct children in a skill that will give them needed prestige with their groups and thus enable them to get some degree of social esteem.

VIII. THE NEED OF A GENERAL SPIRIT OF INQUIRY

In addition to the high-powered, well-organized research carried on over a period of years by organizations or agencies well equipped for such work, a general spirit of inquiry throughout education should be encouraged. Each teacher should be brought, through a process of continuous evaluation, to appreciate the values and defects of her own teaching. Essential to any evaluation is better record-keeping, both by individual teachers and by school systems. The concrete worth of evaluating individual progress is shown whenever teachers ask themselves the question, "How can I tell that my children are learning effectively?"

The following criteria can be set up for answering this question:

1. Does the child show a zest for learning the particular unit?
2. Is the child acquiring the unit readily and without excessive effort?
3. Does the child make relatively few errors or blunders in the acquisition of the unit, or does he make many, particularly many that are inept?
4. Does the child retain the material and use it after it has been acquired?

As examples of continuous evaluation the following may be cited: In one school system each teacher was requested to submit a description of those activities that, in her opinion, had been most effective with her children during the year. The material submitted was carefully analyzed and abstracted. This brought out many suggestions based on the practical experience of individual teachers, which, when made available to all the teachers in the system, resulted in substantial improvement in teaching techniques.

In another system a number of activities were selected on the basis of descriptions given by the teachers who had initiated or conducted them. These were analyzed in detail and specific instructions for their conduct worked out. They were then given to selected teachers for trial. In each room was placed an observer who made a diary record, running account, or rating of the progress of the activity. At the beginning and at the end of the project the children were given tests that were checked against the running accounts and the available records of previous ability and achievement. At the end of the year the projects were modified in accordance with the objective data and the diary records and were tried in their revised form during a second year, after which there was further modification. Such a process, when continued over a long period of time and not permitted to become too set or stabilized, is very valuable and practical. It might even prove superior to many of the more limited and formal methodological studies. And its immediate and practical value in keeping teachers alive and interested in the teaching process is clear.

IX. CONCLUSION AND SUMMARY

As the problem of methods for the determination of the placement of curricular material is studied, one becomes impressed with its extraordinary complexity. The first approach of investigators assumes a specific location for the particular skill and a specific developmental process with which the location can be correlated. With further analysis, we see a configuration of relations between subject matter and development that is easily disturbed if one or another of the interrelated factors is not controlled.

One basic difficulty arises because we start in an educational framework that has certain traditions and makes certain assumptions. When we approach the problem in the light of those assumptions and traditions, we obtain reasonable results, but if we modify the assumptions in some respect, the results tend to lose much of their significance.

In spite of the difficulty of the problem, any impartial observer of modern education will be convinced that there have been great advances. Whereas *a priori* assumptions previously determined the location of material, the problem now has been brought out into the open and an increasing number of able persons are seeking the basic data with which to develop sound educational policy. When one recalls that it is a bare half century since interest in the arrangement of the curriculum appeared and less than twenty years since widespread interest

was awakened in the field of child development, one cannot be too critical of the present attempts to correlate material with development. Many research methods have had to be evolved and much spade work has had to be done to determine the essential and important questions. We see today an increasing refinement of methods, a more definite localization of problems, a broader attack, a clearer realization of the many factors involved, and much more insight. But a panacea is not to be expected. For this growing body of knowledge we have high respect, in spite of its inadequacies when viewed from the standpoint of perfection of method. With the clearer vision of the essential problems that comes with research and study, methods are evolved that carry us forward and increase both the efficacy of the school and the correlation of curricular content with children's needs and interests.

In summary we may point out:

1. Every placement of curricular material represents a compromise between the child's abilities, needs, and interests and the demands of society. In the past, placement has been largely based on tradition and custom rather than upon research findings and has taken little account of the child's needs.
2. In the location of curricular material, the logical approach, characteristic of the past, has not been found adequate and is being replaced by a psychological approach. Experiments and scientific inquiries are replacing earlier and untested methods.
3. If a complete inventory of the skills, knowledge, and attitudes necessary for adaptation could be made, the curricular problem would be simplified. But, because the context in which the child learns and lives is so important, and because the nature of society's demands upon both adult and child is constantly changing, the location of curricular material cannot be determined once and for all but must be the subject of continual research.
4. Research seeks a series of rational or integrative principles based upon systematically observed and recorded data that will facilitate the location of curricular material, rather than mere collections of statistics.
5. The content of the curriculum can be divided into (a) skills and knowledge, which are reasonably specific and are acquired by continuing practice under formal conditions, and (b) general complexes of skills, knowledge, attitude, and understanding that are gradually acquired through life experience. Research has shown that these complexes are built up gradually rather than suddenly and that emphasis

should be thrown, not so much upon a particular or precise location of instructional content, as upon methods and materials adapted to the age and maturity of the child.

6. An ideal experiment would use children sampled in similar ways from the population at different age levels, would give them equivalent amounts of practice with similar materials and methods, and would determine the progress of the children both individually and collectively. It would also use different materials and methods, and should arrive at a general principle or formulation with respect to placement. Few published experiments meet these specifications. In addition to the control or matched-group techniques, more attention should be given the small sample and variance techniques.

7. The importance of publishing adequate descriptions of procedure and results in order that experiments may be duplicated, checked, and compared, and of publishing statistical summaries of results, using standard constants in order that the results of different experiments may be compared and integrated, is stressed. It is also suggested that all studies, in addition to analysis by grade location, make analyses by chronological age, mental age, and experiential background.

8. But even an ideal experiment would not determine whether or not the particular skill or attitude should be taught, nor its effect upon, or relation to, other features of the educational program. In addition to the criterion of ease of learning, other values must be considered.

9. The long-time criteria for the effectiveness of curricular material are: (a) its effect upon the subsequent behavior of the children as children and adults, (b) the permanence or retention of the skills and habits taught, (c) the ease with which they can be reinstated when occasion demands, (d) the change in general point of view or integrative approach to life, and (e) the sensitizing effect upon the child by making him aware of his own potentialities and giving him a sense of direction and of control over himself and his environment.

10. The difficulties of past curricular research arise out of the inadequacy of (a) intensive theoretical experiments on single skills, (b) studies on small segments or units of subject matter, (c) studies that fail to recognize the range of variation in the practical teaching situation, (d) studies that fail to recognize differences in motivation in experimental and practical situations, and (e) overconcern with proof and statistical techniques rather than emphasis on discovery.

11. A list of criteria for evaluating curricular studies is presented.

It covers the design of the experiment, the sampling, the control of factors, the determination of prerequisites for skills, the validity and reliability of measurement, and the checking of norms.

12. Techniques, other than controlled experiments, that have supplied much information are briefly discussed. These are: (a) normative studies and surveys, (b) the determination of interests and spontaneous activities, (c) periodic tests of educational progress, (d) specific studies of contents, processes, and materials in terms of errors, difficulty, and so forth, and (e) the determination of present and future needs and environmental demands.

13. The need and importance of a general spirit of inquiry throughout the school system is stressed. The process of evaluating education is continuous. It is facilitated by better record-keeping, by more adequate observation of individual children, and by local experiments and studies within each school system.

14. The problem of the location of curricular material is one of great complexity. In spite of the incompleteness of our present information, substantial progress has been made. Not only have we clearer insight into the problem, but we are, also, forging the techniques and methods by means of which there will be continued progress toward the goal of adapting school content to the child's abilities and needs.

REFERENCES

- (1) BURK, C. F. "The collecting instinct." *Pedagogical Seminary*, 7. 1900, 179-207.
- (2) DAVIS, EDITH A. "The Development of Linguistic Skill in Twins, Singletons with Siblings, and Only Children." Institute of Child Welfare Monograph, No. XIV. (Minneapolis: University of Minnesota Press, 1937. 165 pp.)
- (3) DEUTSCHE, JEAN MARQUIS. "The Development of Children's Concepts of Causal Relations." Institute of Child Welfare Monograph, No XIII. (Minneapolis: University of Minnesota Press, 1937. 104 pp.)
- (4) FISHER, R. A. *The Design of Experiments*. (Edinburgh: Oliver and Boyd, 2d ed., 1937. 260 pp.)
- (5) FISHER, R. A. *Statistical Methods for Research Workers*. (Edinburgh: Oliver and Boyd, 6th ed., 1936. 339 pp.)
- (6) LEHMAN, H. C., and WITTY, PAUL A. *The Psychology of Play Activities*. (New York: A. S Barnes and Co, 1927. 242 pp.)
- (7) McGRAW, MYRTLE B. *Growth, a Study of Johnny and Jimmy*. (New York: D. Appleton-Century Co, 1935. 319 pp.)

CHAPTER XXI

NEEDED RESEARCH

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I. INTRODUCTION

The purpose of this chapter is to summarize in integrated form the research problems revealed in the Yearbook as pertinent to its fundamental purpose. It is hoped by this means to stimulate teachers and others to undertake the much-needed research.

The chapter is primarily a simple enumeration of problems. Actually the field of research is so broad, and the need so great, that it would be splendid if a permanent supervising and coördinating group of some sort could be established to help initiate, facilitate, and advise concerning the program of research in this field. Such a group could advise prospective investigators of others working on the same or related problems, attempt to interest appropriate workers in different geographical areas, enlist the aid of appropriate authorities, check on experimental procedures, encourage the use of uniform record-taking, and furnish other assistance.

Until such committee or council is organized, the Yearbook Committee stands ready to act as an advisory group, or a clearing house, or in any other way that will facilitate research in the field. For example, in this chapter no attempt is made to suggest appropriate methods for attacking the problems enumerated, but the Committee will be glad to correspond with investigators about methods.

II. GENERAL CONSIDERATIONS

Among the factors that affect development and that must be investigated are experiential background, including both formal and informal teaching and learning, physiological age, mental age, degree of social maturity (or social age), interests, needs (personal and social), socio-economic status, motivation, attitudes, methods of instruction, materials of instruction, length and intensity of instruction, learning procedures, modifiability of native ability, aims and objectives, reading

ability, habits and procedures in thinking and in problem-solving behavior, adjustment status, and inherent difficulty of the material to be learned.

Ascertaining the stage of development, or maturity level, at any one time, however, does not permit accurate predictions beyond that point, for it gives no indication whether the child is going ahead, standing still, or even going backward—knowledge that is all-important for prognosis. Furthermore, even if the direction of development is known, it becomes important to know the rate of development, because future status obviously will differ markedly as that rate is slow or fast. Only studies of the longitudinal type can help solve this problem.

Equally important with direction and rate of growth is the matter of pattern of development. As Chapter I made clear, the different parts of the body do not grow at the same rate; likewise the different aspects of the individual's total development vary in relation to one another. Moreover, whenever the adjustment of the child, the mentality of the child, the emotional stability of the child, or any other component of his total pattern is altered, other aspects of the child are necessarily also altered. It is impossible to measure one aspect of child development and have it stay put while any of the other aspects are subjected to change. The implications for research of the broad and integrated type, involving frequent reexamination, are obvious. This problem, too, must be attacked from the longitudinal point of view and at no time must a single point on the developmental curve be used for the making of predictions.

Even when the patterns, the rate, and the direction of development are known, a real difference may remain between attained and attainable level of maturity. Future research must deal with this important problem also, for the assumption that any particular maturity level is necessarily optimal has no experimental verification.

Another point of view that is becoming increasingly acceptable is that maturation and learning are essentially alike, that they differ quantitatively rather than qualitatively. Wherever we can put our finger on the factors producing change, we speak of learning; where the factors are more elusive, we talk in terms of maturation. Future research must keep this point of view in mind, and also keep in mind that the factors associated with maturation processes may differ from those associated with learning processes primarily because they present more difficult problems.

A realization that education should be provided in proportion to

the individual's needs for education renders it imperative that more be known than ever before concerning maturity levels and the factors influencing such maturity levels. The problem at present is relatively simple because those who may need it most of all tend to be eliminated from our educational system. Enlargement of the field of those to whom education is offered will necessarily call for research on maturity levels in fields now unexplored and unknown.

Again, future research will doubtless study children in the home and in other out-of-school situations, as well as in the classroom. Such study of children in free situations may give a knowledge of child development superior for certain purposes to that secured by studying them in class. With the expansion of our adult and non-school educational program the added need and widened field for research is apparent.

To add to the complexity, maturity levels will shift with the passage of time, with cultural changes, with changes in instructional procedures, with shifts in the socio-economic status of the individual, and with changes in his needs, interests, emotional stability, and the like.

One more word: the needed research and experimentation must be done largely by educators, not delegated to psychologists or to bureaus of educational research. Research must be a part of every school program. Without it, the possibility of ascertaining the maturity of particular youngsters is gone. Teachers, supervisors, and administrators must be committed to the experimental approach. The tentative character of the data secured makes it imperative that our research be continuous and that we be eternally open-minded.

III. RESEARCH PROBLEMS

The first step in any research is the realization of the existence of a problem. In connection with child development and the curriculum, problems arise immediately, once aims or objectives have been formulated. In some areas objectives have been clearly described; in others they are only implied or vaguely formulated. Once the objectives are clearly formulated, another problem arises: To what extent are the formulated objectives being attained? This second problem demands measurement and evaluation. At present we are notably lacking in methods that will help us to measure, or assess, creativity; enjoyment; appreciation; amount, kind, and quality of thinking and of problem-solving behavior. Here is an extensive and crucially important field of research.

The remainder of this chapter is cast mainly in the form of specific questions. To some of these questions research has given no answer; to others more satisfactory answers are needed. For suggestions concerning procedures appropriate to the questions raised, the reader is referred to Chapter XX. As already said, the Yearbook Committee will be glad to reply to specific questions.

1. Research Problems in the Field of Child Development

a. General Child Development

1. What degree of clear thinking, problem-solving, and creative activity is possible at various developmental levels?
2. To what extent does mentality change as the other factors affecting growth are altered or changed? (Various tests of maturity, such as mental-age tests, should be given before, during, and after experimentation, to help evaluate rate, modification, and direction of growth.)
3. To what extent is the entire developmental process, both physical and mental, influenced by different environments?
4. What are the objectives and purposes, the types of material or subject matter, and the forms and techniques of presentation that are especially suited or unsuited to one developmental level of the child as compared with others?
5. Among the several the child may be able to grasp, which materials and activities should be emphasized in the curriculum at a given stage of development if due regard is paid to the child's development as a whole?
6. What are the differences among children in patterns of mental and emotional growth at various developmental levels?
7. How may intelligence be appraised in a more diagnostic fashion than at present?
8. How may the true status of the concepts of a child be ascertained and so dealt with as to insure optimal growth?
9. If subjected to experimental verification as to their appropriateness in connection with child development, what is the validity of certain commonly accepted principles of placement, such as (a) going from the specific to the general (from the simple to the complex, from the concrete to the abstract), (b) from the near to the remote (present to past, nearness in space to distance), (c) from the past to the present, and (d) from the psychological to the logical?
10. What are the factors making for growth in social development, motor development, learning, emotional growth, and so forth, and how do they differ at various stages of child growth?
11. Which aspects of child growth are developmental in nature and which are accidental rather than developmental? (An infection, for example, which may occur at any age is accidental rather than developmental.)
12. What can children do if they are pushed, or forced, and what, if any,

are the undesirable concomitants? (Such studies must be made continually as checks on experimentally determined placements of curricular materials and activities.)

13. At what points are social and genetic criteria of maturity in harmony, and at what points are they not in harmony?

14. What are unselected 'normal' individuals in the later period of childhood like?

15. To what extent is a given achievement influenced by past experience and training as distinguished from relatively more stable physical factors, such as strength, size, and bodily proportion?

16. What is the rôle of social maturity in the placement of activities and materials in the curriculum?

17. What is the effect of regional cultural differences, differences in teaching personnel (e.g., men teachers versus women teachers), differences in the sex composition of classes (e.g., segregated versus co-educational groups), and many other factors, upon the way in which adolescent changes are expressed?

18. What are the important factors in socio-economic status from the point of view of optimal child development?

b. Attitudes

1. Does appropriate adjustment of the curriculum to the mental level of the child facilitate, inhibit, or have no effect upon, the development of desired attitudes and appreciations?

2. What is the rôle of non-school agencies in forming attitudes and determining achievement?

3. What necessary attitudes and understandings can best be developed at various developmental levels?

4. Are attitudes related to mental age?

5. What are the important factors in the genesis of attitude and in its relation to overt behavior?

c. Needs and Interests

1. How do children at various developmental levels spend their time, what activities are essential to their adjustment, and what specific skills do they need?

2. What are children's needs at various levels of development and how far should these affect the curriculum?

3. What social situations in and out of school might make a topic or an activity necessary and useful to a child at various levels?

4. In determining the curriculum, what are the relative rôles of physiological needs, social or status needs, and ego or integrative needs, and how does each relate to level of development?

5. What are children interested in knowing at various developmental levels?

6. What interests facilitate progress?

7. What is the relative value of different kinds of subject matter at various developmental levels?
8. To what extent may socially approved interests be cultivated and to what extent, if any, are they related to readiness? (In many instances our problem is to improve tastes, interests, and appreciations.)
9. To what extent is it possible to have practically equal interest among children with a wide range of ability?
10. As children grow older, what happens to the length of time they hold to expressed interests?

d. Learning

1. What is the relative efficiency of learning at various developmental levels? Does $1\frac{1}{2}$ years at Grade VI equal 1 year at Grade IX, and so forth? Can some mathematical formula be worked out to cover this relation?
2. What are the most appropriate learning activities at various developmental levels?
3. To what extent does need for adjustment accelerate readiness for a new type of learning?

e. Emotions

1. What are some of the positive contributions to child development that the emotions may make, as contrasted with the more negative aspects of emotional problems or maladjustments that are usually studied?
2. What are the most effective ways of motivating human beings at different developmental levels?
3. What is the relation between the amount and kind of motivation and the ease with which a particular skill is acquired at different developmental levels?
4. What is the degree of persistence, in the individual case, of the various behavior problems of early childhood?
5. What are the developmental sequences of the various behavior problems as revealed by longitudinal studies?
6. What are the effects of praise versus reproof, or rewards versus punishment, at various developmental levels on subsequent emotional and personality development or on subsequent confidence and stability in attacking new problems?
7. What is the rôle of emotional factors in learning and general maturing?

f. Motor Development

1. What are the factors that make for readiness for each of the desirable skills?
2. What is the possible effect of abnormal deprivation of opportunity for spontaneous exercise? How does loss from this compare with gains from positive training?

3. Are there general factors in motor development that have practical implications for education?
4. How do children at various developmental levels differ in their capacity to learn and to enjoy specific motor feats and skills?
5. What is the optimal placement of various games and sports according to developmental levels?
6. What is the rôle played by motor skills in the child's social and emotional adjustments at different stages from infancy through later years?
7. What is the nature of motor development beyond the age of three years?
8. What is the developmental relationship between general motor development and the progress of articulation?
9. Over a wide age range, what is the relation between language and motor development?

g. Health Problems

1. How do children's understandings of cause-and-effect relationships in the field of health vary at different developmental levels?
2. To what extent can children at different developmental levels acquire health information, form health habits, and build favorable attitudes toward health?
3. By what process do individuals, over a period of years, acquire habits, attitudes, and knowledge that help them to avoid illness and to attain maximal health?
4. What habits, attitudes, and knowledge are essential to healthful living at different ages and in various environments?
5. What is the relation of morbidity while young to immunity when older?
6. What is the optimal arrangement of work and rest periods during the school day at various levels?
7. What are the sleep requirements of children of elementary and high-school ages?

2. Research in the Various Subjects

a. General Research Problems¹

1. What would happen to our placement levels if we markedly altered the conditions under which they were obtained?
2. What would be the effect upon placement of materials and activities of greatly increased experiential background for the materials and activities to be learned?
3. What aspects of each topic or activity can effectively be taught earlier than the final mastery of the topic or activity and what is the optimal level for each of these aspects?

¹ Problems common to several or to all the specific subjects are listed here rather than under specific subjects that follow.

4. Within what limits does time spent in teaching condition learning effectiveness at various levels?
5. How do different procedures and relationships modify the conclusions reached by the study of subjects in isolation?
6. What methods of teaching, if any, are best suited to one developmental level as compared with another?
7. What changes, if any, would be made in the placement of materials and activities if the method used were a functional and project type of teaching instead of a more formal and systematic type?
8. Does the level at which systematic practice should be located, following informal experience, vary for each subject?
9. What concepts and what vocabulary are needed in the different fields at different levels?
10. What are the appropriate goals in the various fields in terms of developmental levels?
11. What are the factors that stimulate development in each field?

b. Music

We have no measures of important factors in musicality, such as awareness of tonal-rhythmic configuration, or emotional responsiveness thereto. Such standard tests as we have are weighted heavily in the direction of measuring sensory capacity.

1. What should children be taught in music and when should it be taught?
2. Are individual differences more outstanding — and, if so, do they offer more interference to a systematically formulated program — in the field of music education than in other branches of education?
3. In the young child how may the musical stimulus best be scaled, or graded, after simple rhythmical tunes have been introduced?
4. Through what kind of curriculum and method, suitable to various developmental levels, can human beings capitalize more fully upon the extensive and often unused resources for enjoyment that music affords?
5. What possible procedure can be developed and employed for providing a more satisfactory graded approach to the standard instruments, which usually are rather formidable to the beginner?
6. What instruments are best suited to children of various ages?
7. What is the appropriate stage of maturity at which it would be most feasible to introduce piano lessons and training on various string, wind, and percussion instruments?
8. At what level of development is a child 'ready' to learn sight reading if that is to be taught?
9. If, from the point of view of eventual skill or application, there is value in the practice of having children construct instruments of their own and experiment with tone production by means of containers of water, percussion bands, and so forth, is this more true of one level of development than of another?

c. Art

1. What various aspects of art are best suited to various stages of child development? What should children be taught in art and when should it be taught?
2. What is the relation between various phases of art appreciation and the maturity of the child?
3. Through what kind of curriculum and method, suitable to various developmental levels, can human beings capitalize more fully upon the extensive and often unused resources for enjoyment that art affords?
4. Are individual differences more outstanding—and if so, do they offer more interference to a systematically formulated program—in the field of art education than in other branches of education?

d. Industrial Arts (including Home Mechanics)

Valid, reliable achievement tests in industrial arts are sorely needed. Such tests are a prerequisite to determining the predictive value of various factors that are involved. They will give a sound criterion of achievement in industrial arts that is basic to all investigation of the problem of initial instruction and topic sequence.

1. What is the optimal time, in terms of child development, for introducing instruction and what is the optimal sequence of units in the industrial arts?
2. What is the best time and sequence of units in the industrial arts if the purpose be to aid pupils to make certain social or other needed adjustments?
3. What attitudes and other personality factors characteristic of different developmental levels affect success in industrial-arts courses?
4. When may certain necessary attitudes and understandings in industrial arts best be developed?
5. What vocabulary development is prerequisite to adequate success in industrial-arts courses?
6. What changes in needed industrial-arts concepts, if any, occur with changes in chronological age, mental age, I.Q., or grade reached in school?
7. When are children most capable of acquiring the concepts needed for learning in industrial-arts courses?
8. What levels of mechanical ability, motor skills, physical size and strength, intelligence, and interests are necessary to effective learning of the various units of the industrial arts?

e. Home Economics

So little information is available on child development as related to the best time for introducing instruction in home economics and the best sequence of units therein that this is an almost virgin field for research. Further exploration of student interests, abilities, home activities, and needs at different ages, grades, or positions in the family circle are needed, as well as studies of the

content and activities suitable for different specific types of groups — groups that are otherwise comparable but that differ (a) in mental capacity, (b) in social maturity, (c) in economic status, (d) in environment and home standards, or (e) in breadth and range of home experiences.

1. At what level of development should instruction in home economics be introduced and what is the optimal sequence of units?
2. What is the best level, in terms of age, mental age, and social maturity, for learning each of the units of the home-economics courses?

f. Radio

1. In radio what are the objectives and purposes, the types of material or subject matter, and the forms and techniques of presentation that are especially suited or unsuited to one developmental level as compared with others?

2. Along what lines, if any, might certain projects or areas of subject matter, now normally introduced at a given stage of the child's school career, be omitted, or placed earlier or later, to accommodate projects that the radio is peculiarly able to provide?

3. In connection with what projects, if any, may a broadcast profitably be addressed to a narrow or to a wide range of developmental levels?

4. How much time should children at various age levels spend at the radio?

5. What methods might be employed at different levels to cultivate a child's critical faculties and to improve the quality of his interests and tastes in radio?

6. What is the effectiveness of the radio at different levels of maturity in developing 'appreciation,' as well as in developing techniques of thinking, sensitivity to social problems, ability to generalize on the basis of adequate data, and so forth?

7. What are the unique values and limitations of radio broadcasts of various kinds as related to maturity levels?

8. How does increasing immunity to stock devices for injecting excitement and suspense into a radio program develop?

9. What is the effect of entertainment programs on children's information, concepts, and attitudes?

10. What is the effect of radio programs on children's emotions — especially on their fears — as related to age or maturity levels?

11. How can radio programs deal more constructively with children's interests at various levels?

12. How and when do children begin to distinguish the fictional from the real in radio listening?

13. What is the effect of various radio programs on children's sleep at different ages?

g. Motion Pictures

1. How would the present interests in motion pictures of various age groups be changed if a different fare were provided?

2. Does continued attendance have a cumulative effect on character formation?

3. To what extent do efforts to teach motion-picture appreciation at various developmental levels accomplish significant improvements in children's critical evaluations, as well as changes in their tastes?

4. To what extent does use of motion pictures affect readiness and the placements of units of work?

5. Assuming optimal methods of teaching, in connection with what areas and topics can motion pictures best modify the 'readiness' level?

6. What are the effects of motion pictures at various maturity levels in stimulating imagination and interests, and in promoting self-activity?

7. What is the value of documentary films in rendering children at various maturity levels more sensitive to such social problems as soil erosion, flood control, and the like?

8. How may motion pictures be used to study the personalities of pupils, to uncover their interests, and to serve as a subtle means of guidance and character education?

9. What is the optimal length of a film for children of various age levels and for various purposes?

*h. Reading*¹

1. What prereading skills and activities are appropriate to various early developmental levels?

2. What are the optimal physiological, personal, social, and educational conditions under which reading should be introduced?

3. What specific types of understanding in the field of language are essential in the interpretation of meaning, and by what methods can they be developed most effectively at various developmental levels?

4. How may standards and tastes in reading be improved at various levels, especially in the junior and the senior high school?

i. Composition

At present we lack means of measuring the creative, imaginative quality of compositions, or their originality, freshness, and intrinsic interest. Published studies that give reliable measures of the improvement of the quality of oral composition are also lacking.

1. Does too early an emphasis upon correct usage and grammar serve to reduce the motivation of the child for writing, and would the same corrections, offered after writing has become a reasonably automatic process, operate to improve its quality without reducing motivation?

2. What are the uses of oral and written speech at various stages of development?

¹ Most of the problems concerning reading are included among the general problems listed under *a*.

3. What items in composition should children learn at various stages of development?

4. What are the optimal levels at which to teach any of the major elements of composition, such as the various marks of punctuation, particular rules of grammar, phases of sentence structure, or usage of verbs and pronouns? (The lack of information as to the optimal points at which to teach any of these items suggests a field of fundamental research in composition.)

5. What is the frequency of use of the various items of composition in relation to the number of errors made? (If this were ascertained, an index of the difficulty and cruciality of each of the items could be established.)

6. When does the satisfaction in doing his own writing compensate the child for the drudgery involved? How is this related to muscular coördination and length of the composition?

7. What are the detailed characteristics of the writing of the child at different levels, both in and out of school, under favorable conditions?

8. What is the relative learning difficulty of each of the elements of composition under a well-managed instructional program?

j. Spelling

1. To what extent are various words comprehended by children at different developmental levels?

2. What words are most commonly used or needed by children at different levels of development, and which of these are learned as a by-product of composition, reading, and other subjects?

k. Handwriting

1. Is there a rapid gain in speed of handwriting after the eighth grade?

2. Should speed or should quality of handwriting receive chief emphasis in the early grades?

3. When should instruction in handwriting begin?

4. Should the left-handed child begin to learn to write later than the right-handed child?

5. When should instruction in typewriting begin?

6. When should instruction in shorthand begin?

7. To what extent should shorthand symbols be incorporated in writing at various levels of development?

l. Foreign Language

1. What is the relative permanence of the learning resulting from the early versus the late beginning of foreign-language study?

2. What is the optimal time to initiate foreign-language study from the standpoint of the various objectives, as related to individual differences in needs and capacities, and the relative value of modern (or ancient) languages in comparison with other subjects which they would replace or by which they would be replaced?

3. Is the relative effectiveness of an intensive study of a small amount of reading material, as compared with that of a direct method and more extensive reading, a function of developmental level?

4. What is the best age at which to initiate foreign-language study in the case of bilinguals?

5. Is the beginning of foreign-language study necessarily an all-or-none alternative? If not, what aspects are suitable for different developmental levels?

m. Arithmetic

In the field of arithmetic by far the most appropriate research, from the point of view of the fundamental problem of the Yearbook, is the work of the Committee of Seven. Its experiments should be repeated by others under identical conditions, and under conditions in which some one or two elements are varied, in order to verify and supplement the Committee's findings.

1. What are the best criteria of readiness for various topics and activities in arithmetic?

2. What is the optimal mental or developmental level at which to teach any given arithmetical vocabulary?

3. What is the optimal mental level at which to teach various forms of counting?

4. What are the kinds of number uses employed by children in the middle and upper grades?

5. What will be the total result of a curriculum in arithmetic based on the recommendations of the Committee of Seven in comparison with that of a more traditional curriculum? (Data concerning the total result of placements of arithmetic topics in accordance with the suggestions of the Committee of Seven in comparison with the traditional placements are entirely lacking and are much to be desired.)

6. What aspects of each arithmetic topic can effectively be taught much earlier than the final mastery of the topic? (The Committee of Seven definitely states that most of its findings apply only to the teaching to completion of certain topics, and that further research is necessary to determine the best time for teaching the various simpler elements of these topics.)

7. How can we evaluate the child's concepts, his realization of function, or his experiential understanding of the work in arithmetic, in comparison with our evaluation of the child's knowledge by means of his ability to perform in the abstract the operations that have been taught?

8. What will be the effect upon placement of arithmetic topics of greatly increased experiential background for the topic to be taught? For example, how much less difficult would the harder multiplication facts prove to be if the child had had many experiences with numbers corresponding to the higher products?

9. Within what limits does time spent in teaching condition effectiveness of learning at various levels?

10. What, if any, are the inherent difficulties at different developmental levels of solving 'story problems' involving reasoning, and how do these differ from the difficulties of arithmetical processes? Is there anything inherently easier or more difficult about stating a problem in story form rather than merely indicating the process and the figures, as in the case of abstract drill?

n. Social Studies

Research dealing with clearly defined social-studies materials and activities, presented uniformly at various grade levels and checked against various child development factors, is nowhere available. Definitive research of this sort must be forthcoming if progress is to be made in this field. In no investigation have attempts been made to teach the social-studies concepts or skills by identical methods and time allotments, over a span of several grades, in order to ascertain clearly at what level the desired degree of mastery occurs. Indeed, the basic problem of the developmental level needed for the understanding of a particular concept, or particular aspect of a concept, has hardly been touched upon.

There is also urgent need for studies in which allowance is made for growth of given concepts in individual children. In the past, a given meaning for the concepts dealt with has been assumed, with very little attention to context, or shades of meaning, or to the varying degrees of adequacy of the concepts at various developmental levels.

Furthermore, in no instance have the mental tests used to ascertain level of maturity been given more than once, though it is quite conceivable that work with the concepts studied may have altered the mental-test scores.

1. Where will concepts, materials, skills, and activities in the social studies be placed if crucial experimentation is undertaken (using the same teaching procedures at various levels and then checking against the various factors in child development to ascertain optimal placement)?

2. Do degrees of learning ability in the social studies exist? If so, what are they and how do they relate to developmental levels?

3. Would the correlation of mastery of social-studies concepts with mental age, go up, or down, or remain the same, if an effort were made to equate for the teaching of the concepts, or if an effort were made systematically to instill the concepts involved?

4. To what extent does mental ability play the crucial rôle in the mastery of given social-studies concepts, and to what extent is such mastery associated with wider experience?

5. If certain social-studies concepts could be scored for the degree of their completeness, would their development be more highly correlated with mental age?

6. To what extent, if any, will direct instruction cause earlier learning than will incidental teaching?

7. To what extent are the desired attitudes in the social studies attained at

various developmental levels, and what is the effect of different methods of instruction?

8. Does appropriate adjustment of the social-studies curriculum to the child facilitate, inhibit, or have no effect upon, the development of desired attitudes and appreciations?

9. To what extent does mentality change as the other factors affecting growth in the social studies are changed or altered?

10. How may children's activities in various citizenship groups and similar organizations be used to evaluate growth in the social studies?

IV. SUMMARY AND CONCLUSIONS

1. The general theoretical implications underlying research dealing with child development and the curriculum have been presented.

2. Suggestions for research embodied in various chapters of the Yearbook have been summarized and presented, largely in the form of questions. These questions cover a wide range of difficulty and demand modes of research ranging from the simplest classroom experimentation to factor-analysis and elaborately planned experimentation.

3. A central coördinating agency for research in the field of child development and the curriculum has been proposed. The Yearbook Committee meantime proffers its services.

4. The need for coöperative research in the study of developmental levels and of curricular construction, including active participation by teachers, has been stressed.

5. Finally, research in the field of child development and the curriculum, as elsewhere, must be continuous. Matters cannot be settled once and for all, since maturity levels may well shift as the factors underlying them shift. Hence we need to cultivate not only the desire to discover and the patience to experiment, but also the attitude of good men of science to avoid undue prejudice and to forsake our convictions and conclusions whenever new evidence shows them to have been premature and unwarranted.

CHAPTER XXII

A CRITIQUE

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In his introduction Chairman Washburne makes the statement that there could be three possible yearbooks in the general field that the present volume covers. The first would be a yearbook on child development, the second would deal with the materials and activities that should be included within the curriculum, while the third (which is the present Yearbook) would deal with those aspects of child development that are likely to be a direct practical guide to curricular organization. Later in the introductory chapter the Chairman states that the Yearbook is concerned with discussing whatever data are available in regard to the stage of development when a child is ready for a given type of learning or activity. If the present writer understands the point of view of the Yearbook, it assumes that there is in existence a body of subject matter, the learning of which constitutes an education. The immediate educational problem, therefore, is that of determining when or at what stage of development such material can best be taught. If one accepts this basic point of view, he will no doubt feel that the present volume is a significant contribution. The data have been carefully compiled and treated in a scholarly fashion. Each chapter contains an analysis of significant researches bearing on the major problem of the Yearbook.

Generally speaking, the writer feels that the Yearbook will be of greater interest to the specialist than to the teacher. So few interpretations of data have been given and those given are presented in such form that classroom teachers will be able to make relatively little use of the material. One can well understand the reasons for such scant interpretation. There is always the fear of going beyond one's facts. Yet we remember that the teacher must *act* with or without the presence of clearcut scientific evidence.

Another shortcoming (no doubt the result of the general point of

view of the book) is the inadequate consideration given to the social nature of education. Education, as interpreted in the Yearbook, is largely the acquisition of facts and skills. The result is that education is not viewed as a social process to the degree one might have wished.

The writer's chief criticism, however, is not of the manner in which the Committee has executed its plan for a Yearbook. He wishes rather to challenge the major assumptions on which the project is based. From his point of view, there is no existing body of subject matter, the mastery of which constitutes an education. To him, education is creative living on the part of children, teachers, and parents in school, home, and community. The major goal in this creative life is not the mastery of subject matter; it is rather the well-rounded growth and development of children, teachers, and parents. Since all children are unique and dynamic organisms, it does not seem appropriate to speak of the relation of the curriculum to child development as if the curriculum were something already in existence and something the child must somehow master. We should rather ask what experiences would contribute most to the development of an individual child, of a given personality in process of growth.

Let us add, also, that the point of view taken by the writer recognizes fully the place of subject matter in education. It regards subject matter, however, as a means and not as an end in itself. It assumes further that the child chooses (with the help of the teacher) from the rich storehouse of materials available those experiences that most perfectly meet his unique developmental needs. What really happens is that there will be as many curricula as there are different children. The fact that there will be many common elements does not negate the principle of individualization. We must realize that in thinking of arithmetic, for example, we should not only ask when it should be learned but also what arithmetic should be learned, if any. What is even more important, we should not start with arithmetic but with the child and his developmental needs.

When we think first of the curriculum and how we can adapt it to the child, our entire child study approach is influenced by our orientation. Thus, when the child studies music and we test him, we find out what he is achieving in music; when he studies arithmetic, we test him and find out what he is achieving in arithmetic. The teacher, however, should be interested in what happens to the child as a whole when musical or arithmetical experiences are included in his curriculum, not only or even primarily in what happens in music or in arithmetic. If,

for example, a child encounters the word *judgment*, the important question is not whether he can spell it correctly two days later. The important question is how his effort to learn to spell this word affected his total personality. Has he from this experience gained in creative powers, in his ability to be himself, in faith in himself, and in his ability to live creatively with others?

Most of our child study has not been child study at all. Our question has not been, "What happens to the child when he tries to learn to spell the word *judgment*?" Our question has been, "What happens to the word *judgment* when 1,000 children try to spell it?" We are thus not studying what subjects do to the children but what the children do to subjects. In this respect we in education are far behind medicine. The writer has a friend who cannot eat eggs without consequent illness. The fact that eggs are salutary in their effects on the majority of people does not make them good for this person. In medicine the doctor studies each patient and tries to devise for each a course of treatment that is really individual. That there are common elements in the treatment of pneumonia patients does not negate the principle of individual diagnosis and treatment.

When we try by statistical methods to determine the age at which long division should be taught, we secure only rough data that we must be careful not to apply to all children. We must always think of the individual child irrespective of statistical data. Dependence upon generalizations from statistical data mislead the teacher in dealing with individual children. We shall not have a real science of education until we study individual children and in this study concern ourselves with what happens to the child rather than what happens to the subject or to subject learning.

To repeat, Chairman Washburne in his opening chapter says that three yearbooks might have been written. May the writer be so bold as to propose a fourth? In this yearbook we would use the literature on child growth and development and on the nature of the human organism in developing a philosophy of life and of education. We would then indicate the general character of a school that harmonizes with such a philosophy. Several such schools are probably in existence. We could then go to these schools and study the growth and development of individual children on a case-study basis. In such studies individual children would be primary and subjects secondary. We would be studying individual developing personalities, not mass data. We would be thinking about what happens to children rather than to subjects. We

would conceive the curriculum in creative rather than in formal, prescribed terms.

In the beginning such a yearbook would be organized on the assumption that it is useless and dangerous to attempt to find a curriculum that is good for all children; that no subject has a place in the education of an individual child except as it contributes to his growth; that before we decide when a unit of learning should be taught, we should decide whether or not it should be taught at all to an individual child; and that the problem of the time at which it should be taught is an individual matter to be answered for each child.

From such studies as are suggested above we would secure no general pattern that could be applied in every school. But we would have reports of many experiences of teaching in helping children to build curricula designed to be creative in their effect on the child. In the same way as case histories in medicine are suggestive to the physician, so these studies would be helpful to teachers. But, perhaps the whole effort to develop a school that bases its organization and procedures on our accumulating knowledge of child development is visionary. Perhaps we shall not for a long time have many schools that really make the creative development of individual children their primary objective. Perhaps we shall keep on teaching subjects, collecting statistics, and recording the damage done to several bodies of subject matter by unappreciative children.

INFORMATION CONCERNING THE NATIONAL SOCIETY FOR THE STUDY OF EDUCATION

1. PURPOSE. The purpose of the National Society is to promote the investigation and discussion of educational questions. To this end it holds an annual meeting and publishes a series of yearbooks.

2. ELIGIBILITY TO MEMBERSHIP. Any person who is interested in receiving its publications may become a member by sending to the Secretary-Treasurer information concerning name, title, and address, and a check for \$3.50 (see Item 5).

Membership is not transferable; it is limited to individuals, and may not be held by libraries, schools, or other institutions, either directly or indirectly.

3. PERIOD OF MEMBERSHIP. Applicants for membership may not date their entrance back of the current calendar year, and all memberships terminate automatically on December 31, unless the dues for the ensuing year are paid as indicated in Item 6.

4. DUTIES AND PRIVILEGES OF MEMBERS. Members pay dues of \$2.50 annually, receive a cloth-bound copy of each publication, are entitled to vote, to participate in discussion, and (under certain conditions) to hold office. The names of members are printed in the yearbooks.

5. ENTRANCE FEE. New members are required the first year to pay, in addition to the dues, an entrance fee of one dollar.

6. PAYMENT OF DUES. Statements of dues are rendered in October or November for the following calendar year. Any member so notified whose dues remain unpaid on January 1, thereby loses his membership and can be reinstated only by paying a reinstatement fee of fifty cents, levied to cover the actual clerical cost involved.

School warrants and vouchers from institutions must be accompanied by definite information concerning the name and address of the person for whom membership fee is being paid. Statements of dues are rendered on our own form only. The Secretary's office cannot undertake to fill out special invoice forms of any sort or to affix notary's affidavit to statements or receipts.

Cancelled checks serve as receipts. Members desiring an additional receipt must enclose a stamped and addressed envelope therefor.

7. DISTRIBUTION OF YEARBOOKS TO MEMBERS. The yearbooks, ready prior to each February meeting, will be mailed from the office of the publishers, only to members whose dues for that year have been paid. Members who desire yearbooks prior to the current year must purchase them directly from the publishers (see Item 8).

8. COMMERCIAL SALES. The distribution of all yearbooks prior to the current year, and also of those of the current year not regularly mailed to members in exchange for their dues, is in the hands of the publishers, not of the Secretary. For such commercial sales, communicate directly with the Public School Publishing Company, Bloomington, Illinois, which will gladly send a price list covering all the publications of this Society and of its predecessor, the National Herbart Society. This list is also printed in the yearbook.

9. YEARBOOKS. The yearbooks are issued about one month before the February meeting. They comprise from 600 to 800 pages annually. Unusual effort has been made to make them, on the one hand, of immediate practical value, and on the other hand, representative of sound scholarship and scientific investigation. Many of them are the fruit of coöperative work by committees of the Society.

10. MEETINGS. The annual meeting, at which the yearbooks are discussed, is held in February at the same time and place as the meeting of the American Association of School Administrators.

Applications for membership will be handled promptly at any time on receipt of name and address, together with check for \$3.50 (or \$3.00 for reinstatement). Generally speaking, applications entitle the new member to the yearbook slated for discussion during the calendar year the application is made, but those received in December are regarded as pertaining to the next calendar year.

Box 822, Clifton, Mass.

GUY M. WHIPPLE, Secretary-Treasurer.

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